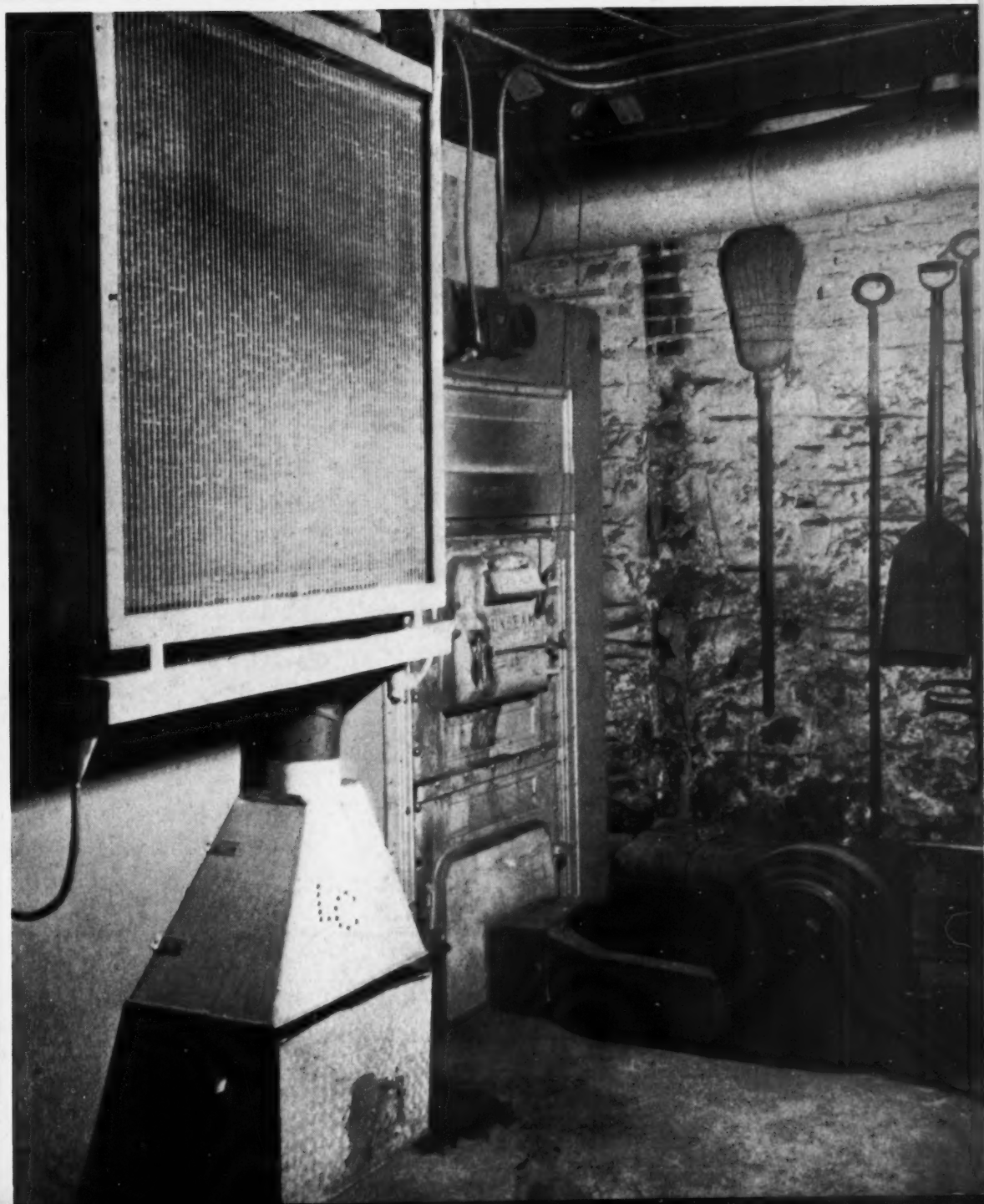


# AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING  
WARM AIR HEATING • SHEET METAL CONTRACTING



ESTABLISHED  
8 8 0

TS200  
.AT

# LAMNECK SERIES 700 SYSTEM PREFABRICATED DUCT AND FITTINGS

**GREATER  
FLEXIBILITY**

**Takes Care of More Jobs With  
Fewer Parts and Smaller Investment**

● In its complete adaptability to the requirements of all types of installations, however complex, Series 700 System is a triumph of skilled and sound engineering. With far less parts than any system heretofore produced it is so extremely flexible that the combinations which can be made from Series 700 are practically unlimited.

Yet, so accurately is it engineered that in every case to which it is applied this advanced system achieves a high standard of efficiency never before approached in the history of the industry. At the same time its remarkable ease and simplicity of assembly and installation—with less cutting, fitting and complicated figuring—substantially reduce waste and lower costs of both

material and labor to an unheard of degree.

With fewer parts, which are more flexible and interchangeable, smaller stocks are required

**Simplifies Ordering,**

**Shipping**

**and Stocking**

and less investment necessary to carry everything you need in Series 700 System to meet all requirements.

Storing and shipping are also simplified so as to produce a much lower handling cost. Yet you will be more completely equipped than ever before to take care of a wider range of installations and make a bigger profit. You'll appreciate this fact when you see this amazing new line.



*Write for Name of Your Nearest Distributor*

**LAMNECK PRODUCTS, INC.**

**414 DUBLIN AVENUE**

**COLUMBUS, OHIO**

**PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL  
WARM AIR HEATING AND AIR CONDITIONING SYSTEMS**





**STEP OUT WITH Lochinvar  
and YOU STEP UP YOUR SALES**

**THE LINEUP OF THE BIGGEST FURNACE VALUES ON THE MARKET**

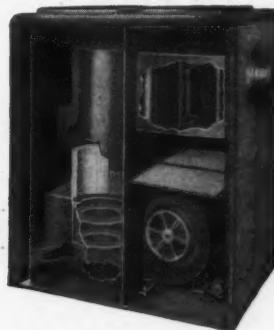


Challengeaire, Lochinvar's new Package-Unit for the lowest price homes. A fully automatic, oil-burning winter air-conditioning unit that's shipped completely assembled with blower, motor and all controls mounted and wired. Is 24" wide, 43" high, 54" long (can pass through any door)



The Model 100A is a complete winter air-conditioning unit with 110,000 B.T.U. output at register with a 1,700 c.f.m. capacity.

Dimensions—32" wide, 57" high, 69 $\frac{3}{8}$ " deep.



The Junior-Aire is a complete winter air-conditioning unit with a B.T.U. capacity at the register of 85,000 and c.f.m. capacity of 1,000.

Dimensions—32" wide, 53" long, 54" high.



The Model 100 is a gravity warm air furnace, ideal for replacement, for its price complete is about the same as an ordinary oil burner alone.

Dimensions—36" wide, 41" deep, 64" high.

● Lochinvar furnaces are one of the largest selling line of furnaces on the market today. The reason for this sales leadership is not only through their low prices but because each unit is constructed to give dependable and economical performance at all times.

**HERE'S A SPRING TONIC FOR YOU . . . LOCHINVAR'S WATER HEATERS**

**MODERN IN DESIGN**

**20, 30, 40, 50 gallon SIZES**

**Multiple-Stage BURNER**



**PRICES ARE THE LOWEST**

**COMPLETELY AUTOMATIC**

**ECONOMICAL TO OPERATE**

● Lochinvar's automatic oil burning water units are now available in the 20, 30, 40, and 50 gallon sizes, they are attractively designed, and their economical and trouble free performance makes them a popular unit among the builders and home owners. You'll find

that these water heaters are truly a "spring tonic" to your slump in sales during the "off" season for furnaces. Why not let us tell you more about the complete Lochinvar line, by writing for literature and prices today?

**LOCHINVAR CORPORATION**

**14247 FIREMAN  
DEARBORN, MICH.**

# AMERICAN ARTISAN

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

WITH WHICH ARE MERGED

FURNACES  
SHEET METALS

AND

Warm-Air  
Heating

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor

Vol. 108, No. 7

July, 1939

Founded 1880

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## In This Issue

**T**HIS month's cover shows an interesting summer cooling (private well water) and winter air conditioning (bin-feed stoker) system in Belvedere, Ill. Details of the design and a sketch of some of the installation headaches are on page 46.

Also of interest is the article on page 40 by a sheet metal contractor-author who suggests attic fans above the roof as a profitable activity. The merit of the idea is proved by the author's list of successful jobs.

Domes covered from the base up are no rarity, but domes covered from the top down are, we believe, something out of the ordinary. How is it done? Caleb Ringle, the contractor, tells how one such dome (of stainless steel) was handled.

Ways and methods of reducing time and material required in shop fabrication are becoming of more importance as more and more shops turn to specialties for a steady profit. On page 63 we publish part I of a two-part article on welding methods coupled with layout and assembly.

The furnace industry has long needed a booklet, in popular language, which says nothing about a particular furnace, but tells the story of warm air heating as an established science. The National Warm Air Ass'n now has such a book in preparation. We tell about the booklet on page 24.

Joseph Dingle has written many articles on bookkeeping for American Artisan, but on page 28 he introduces a much overlooked fact—that the ONLY adjustable factor in profit-making is the line between Overhead and Profit. In your adjustment of this line lies your only possibility of making a profit or losing money.

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**More than 8,000 Copies of this Issue are being distributed**



By TIM SHEARS

OVER at the dog-wagon, getting a bite to eat, some of the boys start talking about what's good for the inner man. "I'd give a couple of bucks for a hunk of real good pie," says one. "You know the kind I mean...like Mother used to make."

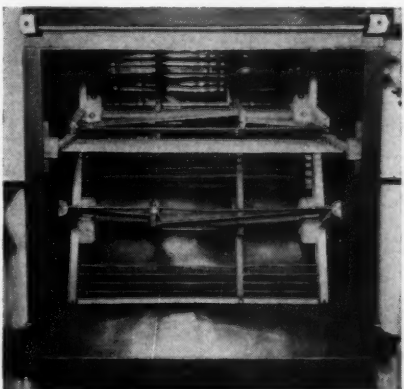
Like a flash I take him up on it. "Stick around with me this afternoon," I tell him, "I'll show you a place where you can get all you want of them kind of pies."

It's O.K. by him, he says, an' it's O.K. by me because I have to call on some bakeries that afternoon, anyway. So off we hike to Brooklyn.

I take him in one or two places where they use Monel equipment. We see hoppers, fruit-washing sinks, ventilating hoods, tables an' what-have-you all made of Monel.

"How come they use Monel in these bakeries?," asks the boy friend. "They

*Cleaning a dough mixer is no cinch, as Tim Shears says, so this one is lined with Monel...a job that pays both baker and sheet metal contractor.*



JUST LIKE MOTHER USED TO MAKE!



ain't no corrosion around here, is there?" "Not so you'd notice," I answers, "but dough an' fruit an' such will soon cause rust...if you give 'em half a chance. An' also," I adds, "look at them table tops. You can see they have to stand plenty of bumping. Imagine trying to roll dough if them tops were all dented up?"

Finally we gets to the big bakery where I'm aiming to give him a sample of real "home" cooking. "We'll both have apple," I tells the bake shop foreman, who's a good friend of mine, "An' don't forget the cheese," I adds.

You ought to have seen the face on my pal as he dug into his portion. "It's practic'ly as good as what Mother brought me up on," he admits. "How do you do it?" he says to the foreman. "Well," replies the foreman, "we use nothing but the best of ingredients...an' we keep 'em fresh. In fact, Tim here could tell you something about that."

So I point out some of the Monel equipment: The machine that mixes the dough, for instance. They don't want rust in bread, an' cleaning a dough mixer's no cinch anyway. So they line

this one with Monel. In addition to jobs like we see in the other plants, this one has big hoppers made of Monel, an' a raisin washer that has quite a story back of it: The metal parts that come in contact with the raisins were first made of zinc. They lasted just a month. Then the bakery tried galvanized iron. That gave out in three months. Now, Monel is used...and it's still like new after five years.

\* \* \*

I hope this gives you some ideas on why bakers want Monel...an' how a smart contractor can fabricate it for 'em an' make real dough himself. Some pun, eh kid? Well, if you have any questions just drop me a line. I'm generally around...except when I'm out on the trail of a piece of pie.

Yours an' etcetera,

TIM SHEARS.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street

New York, N. Y.

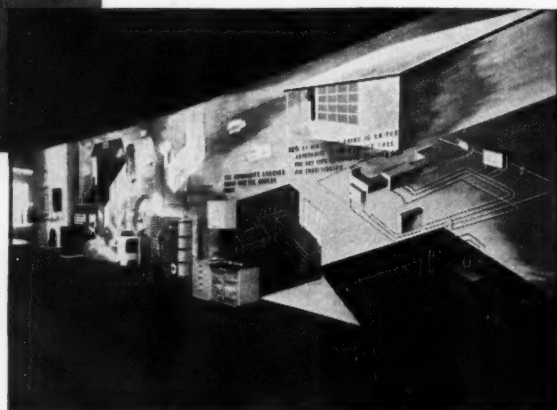
"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.





*This Seal of Approval appears on equipment only after a representative sample has satisfactorily passed rigid and impartial tests at the Anthracite Industries Inc. Laboratories.*

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**THOUSANDS SEE THE WORLD'S FAIR ANTHRACITE EXHIBIT**  
**HUNDREDS CHOOSE MODERN ANTHRACITE EQUIPMENT ON DISPLAY**

**E**VERY day thousands of visitors attend the Anthracite Exhibit in the Home Building Center of the New York World's Fair. Most of these thousands are not merely sightseers, but thoughtful householders. Many of them are discovering for the first time how efficient, economical, and how convenient modern Anthracite equipment really is.

### *What heating contractors can learn*

Every plumbing and heating contractor can learn a lesson in modern merchandising from the Anthracite equipment prospects who visit the Fair. Here are people learning for the first time that there are such conveniences as

automatic Anthracite stokers, that thermostats can be attached to existing heating equipment for automatic heat control and extended firing periods. Here are people who are eager for information about the new and improved Anthracite equipment you sell and install.

The important lesson for the plumbing and heating contractor is that there are literally thousands of homes eager to install Anthracite equipment. Many of these thousands of homes are awaiting only the information you can give them to be completely sold.

Anthracite Industries, Inc.  
 Chrysler Bldg., New York

*Save with*  
**ANTHRACITE**  
 (HARD COAL)  
**THE ONLY 7 STAR FUEL**



**DON'T PLAY**

*Blindman's  
Buff*

**ON HUMIDIFICATION  
INSTALLATIONS**

## **MONMOUTH CAPACITY CHARTS REMOVE GUESSWORK FROM HUMIDIFICATION**

★Two important factors are essential to every humidification installation. First, you must know the evaporative capacity required. Secondly, you must use humidifying equipment for which all capacity data is specifically furnished.

In other words, you must first *know* what capacity unit a particular job needs, and *then know* that the unit selected has that particular capacity.

Too often the information supplied to dealers is not specific and he finds the "going blind" in this highly specialized work.

To eliminate this weakness Monmouth

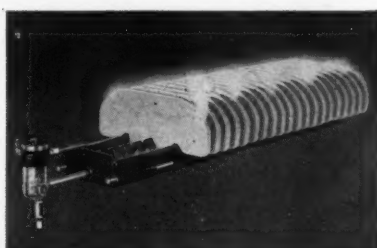
engineers have developed *exclusive* charts which instantly give you scientifically correct information on both these essential factors.

Consequently, there is *never* any guesswork on a Monmouth installation. Any salesman or workman can understand these simple charts perfectly.

The accuracy of this data is borne out by the experience of many leading furnace manufacturers who are using Monmouth humidifiers as standard equipment.

Complete information and prices will be gladly sent upon request.

**MONMOUTH PRODUCTS CO.**  
General Offices and Factory  
1933 E. 61st ST. CLEVELAND, OHIO



**AUTOMATIC**  **JUNE**

**GRADUATED HUMIDITY CONTROL**



*There  
Never Was  
a Line Like  
This Before!*

Imagine a dozen different models in the place of **each one** shown here, then add eight or ten more. That's the **complete PREMIER Line**—up to the minute in styling and engineering—built to give first class performance—priced to meet virtually any competition.

This remarkable line opens up for you a market so broad that it will keep you busy the year around making profitable sales and installations. With this line you can really merchandise home comfort in all seasons... and PREMIER will help you do it!

Find out about this exclusive PREMIER proposition that is proving such a gold mine to dealers in many states. Write for the big PREMIER portfolio that describes the entire line—tells all about the PREMIER 9-Point Dealer Plan. Don't lose business by waiting. Get the facts now!

**PREMIER FURNACE CO.**  
DOWAGIAC . . . MICH.

**PREMIER**  
*The Year 'Round Line*  
HEATING, AIR CONDITIONING,  
AUTOMATIC FUEL BURNING, COOLING

## Gravity Furnaces

A complete line—two series of cast alloy iron furnaces... two series of rivetted and welded steel units—more than 18 different models and sizes, most of them covered by our 10-year guarantee that includes the grates. Every furnace completely assembled, tested, and triple inspected before shipment, saving installation time, insuring better performance.



PREMIER MASTER ALLOY IRON SERIES

## Air Conditioners

A wide range of types and sizes, including many special steel units for stoker, oil, and gas, as well as Cast Iron and Steel "package" units for hand firing. All beautifully styled—highly compact, remarkably efficient.



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*And Never Before  
a Merchandising  
Program So Helpful  
to Your Success!*

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A full line of "add on" blowers, with capacities up to 25,000 C.F.M. Still larger sizes on special order. Both single and double wheel types are offered, as well as complete line of blower assemblies without cabinets.



SERIES "B" BLOWER

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A complete line of stokers from 25 lb. to 750 lb. capacity, for all domestic and commercial needs. Ultra modern in appearance and engineering, with intermittent feed and many other sales features.



MODEL "K"

## Oil Burners

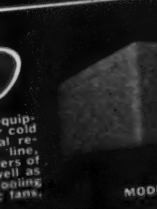
Four models of handsome appearance and modern engineering, with "Buoyant Flame" principle of design that results in unusual quietness, dependability, and fuel economy. Furnished with high quality PREMIER controls.



MODEL "G"

## Cooling Equipment

Summer cooling equipment utilizing either cold water or mechanical refrigeration. A full line, including room coolers of several types, as well as complete central cooling systems. Also attic fans, for night cooling.



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PREMIER gives you a wealth of advertising helps—result getting promotional material on every part of the line.

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PREMIER gives you its famous Prospect Follow-Up Service FREE—a service that has a .500 batting average in closing sales.

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*Write FOR FREE  
PORTFOLIO!*

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**NOW IN THE REGISTER of REGISTERS**  
*STOCK and Priced Surprisingly Low!*

INSTANT  
 ADJUSTMENT  
 OF AIR FLOW  
 — UP —  
 STRAIGHT  
 OR DOWN



By simply turning  
 the regulator on the  
 register face with key  
 provided



you get  
 THIS—

Fig. 1  
 20° deflec-  
 tion UP;  
 Regulator  
 set at "U"  
 P

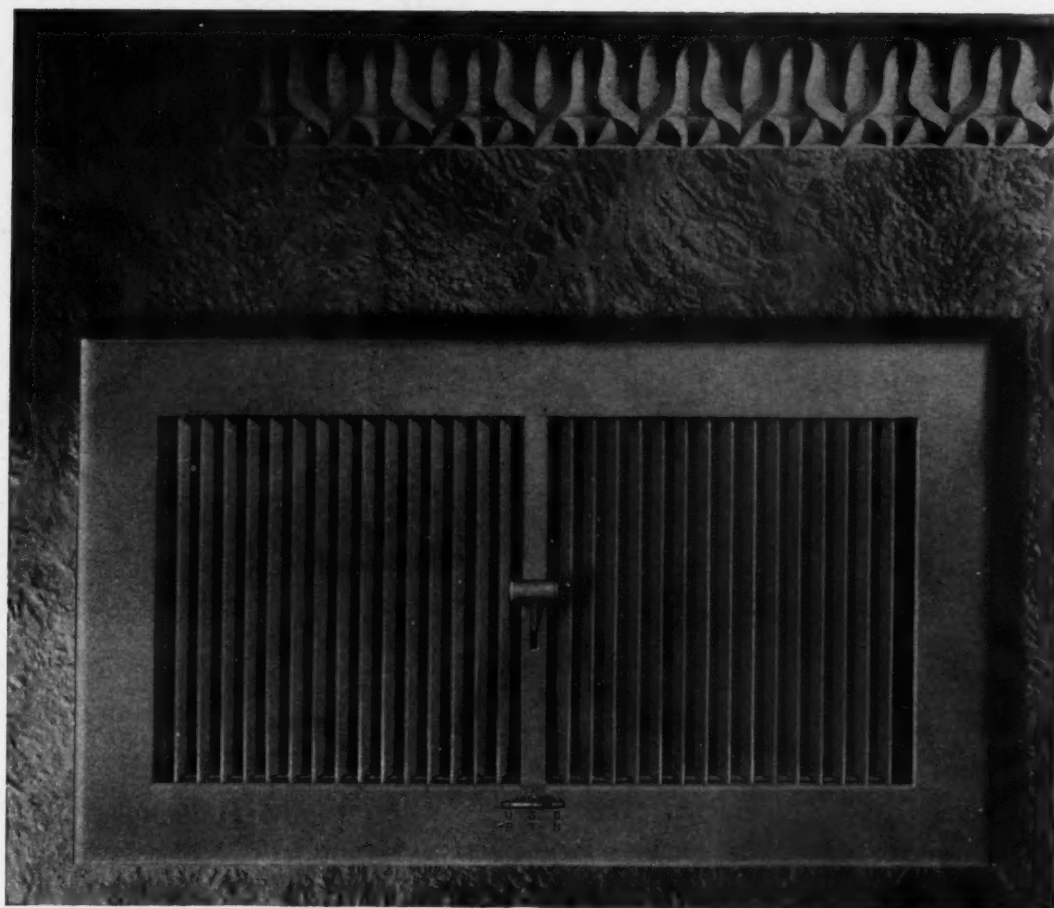
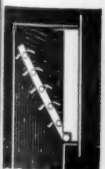
THIS

Fig. 2  
 Horizontal  
 air flow;  
 Regulator  
 set at "S"  
 T



or THIS

Fig. 3  
 20° deflec-  
 tion DOWN;  
 Regulator  
 set at "D"  
 N



## No. 86 **H&C** DESIGN

ADJUSTABLE DOUBLE DEFLECTION REGISTER  
 with TURNING-BLADE VALVE

18 different air flows instantly obtained on the job—up, down or straight, combined with 6 different sideways deflections. No. 86, therefore, affords perfect air distribution under all circumstances. It is attractive in a manner that harmonizes with any interior, and because it is the ideal register for every type of installation, the No. 86 offers the opportunity of cutting your register stock to the minimum.

With all these advantages it is no wonder that many installers have the impression that No. 86 is expensive. As a matter of fact, however, No. 86 is *surprisingly low in price*. Check with your H & C Jobber and you will readily discover that it is not only *The* register of registers, but also, **THE BEST BUY IN REGISTERS.**



**AIR FLOW  
 CAN BE QUICKLY  
 ADJUSTED SIDEWAYS**

The air flow is controlled sideways by the vertical bars (3/4" deep on 1/2" centers) which may be turned 45° to either side with the same key used for turning the regulator. The register face is divided into two sections by an attractive vertical mullion. The bars in each section are connected with each other, so that by turning one bar in a section, all the bars in that section turn simultaneously, making it a simple matter to obtain practically any sideways deflection of the air.

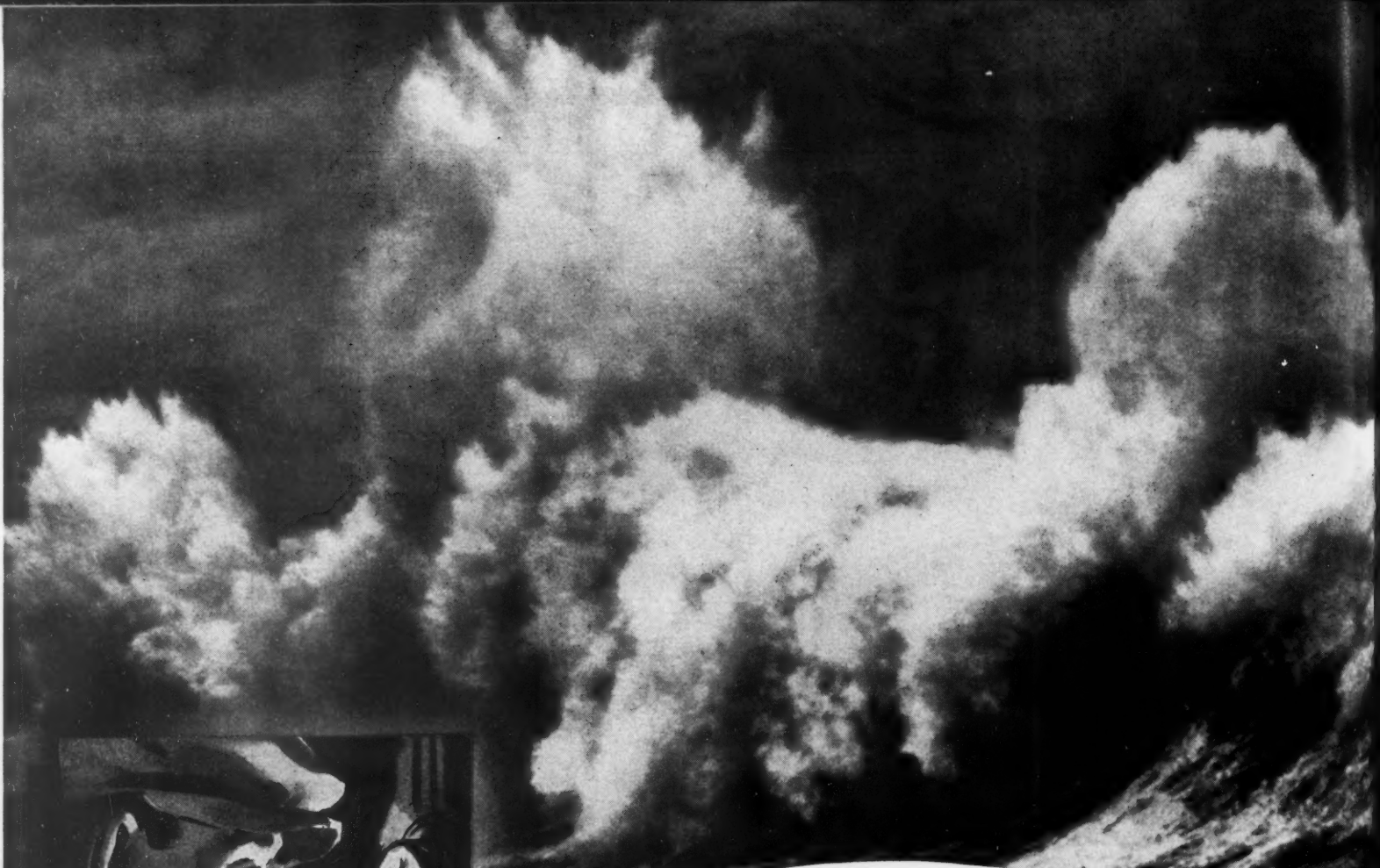
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Warm Air Registers • Air Conditioning Grilles • Damper Regulator Sets • Dampers • Chain • Pulleys

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of water, 5 tons of air--ore, coal,  
limestone--and MEN to make a ton of  
Youngstown Steel**

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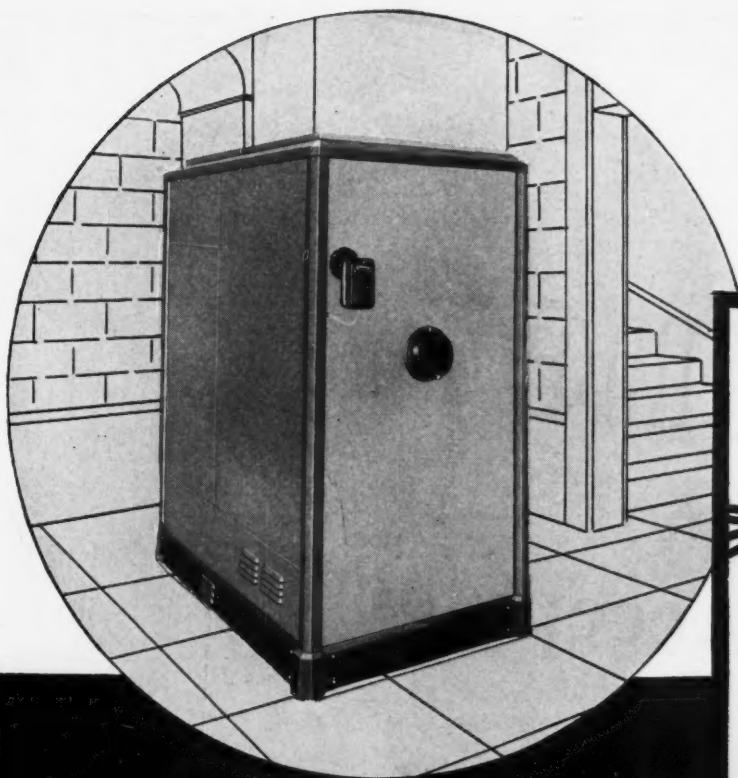
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**THE  
YOUNGSTOWN  
SHEET AND TUBE COMPANY**

Manufacturers of Carbon and Alloy Steels  
General Offices - YOUNGSTOWN, OHIO



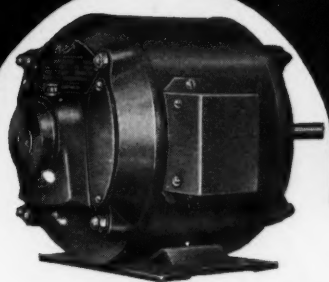


*Century's Motor Specialization  
+ Correctly Engineered Application  
= Satisfaction and Economy.*



## *Century* MOTORS

**Protect Your Installations  
Against Breakdowns Caused by  
Moisture and Damp Basements**



*for*

### **Your Convenience**

Century Motor Specialists are located in these key centers:

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Cincinnati • Cleveland  
Dallas • Denver • Davenport  
Detroit • Houston • Indianapolis  
Kalamazoo • Kansas City  
Los Angeles • Milwaukee  
Minneapolis • New Orleans  
New York • Omaha  
Philadelphia • Pittsburgh  
Rochester • Salt Lake City  
San Francisco • Spokane  
Seattle • Tulsa



**T**O GUARD against destructive effects of moisture, damp basements and lubricating oils, Century fractional horsepower motors are built like larger Century motors.

Laminated slot insulation is built up of varnished fabric for electrical strength and heavy fibre for mechanical strength. Century uses this type of slot insulation on all sizes of motors.

Century's exclusive insulation treatment thoroughly saturates the winding with insulation compound which resists moisture absorption — cements coils together — prevents chafing between wires — is thin enough to radiate heat — resists mechanical abrasion.

Buy this added protection for motors that "sweat" during the summer in damp basements and humid climates, which are called on to start on the first cold day before they have had a chance to dry out.

Makes friends because the equipment you sell builds satisfaction.

A Century Motor Specialist who lives near you will gladly help select the right motor.

### **CENTURY ELECTRIC COMPANY**

1806 Pine Street

St. Louis, Mo.

**One of the Largest Exclusive Motor Manufacturers in the World**



*Since 1885*

**Partners**

**in**

**Public Acceptance**



**AUTOMATIC HEATING**

**and**

**MINNEAPOLIS**

**HONEYWELL**

*Control Systems*

**N**O DEALER who standardizes on Minneapolis-Honeywell Controls ever finds it necessary to devote sales or consumer advertising effort to gain acceptance for the Control System.



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## *Automatic Speed Control*

*puts new life in your blower business*

VIKING pioneered HIGH-LOW Speed control—making possible even temperatures—at all times—for every room in the house. Now VIKING presents its new 1939 line of blowers and conditioners—engineered for most efficient economical multi-speed operation.

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Every step in the production of Viking blowers and conditioners is directed by the best engineering skill in the industry.

Viking's reputation for superior performance is your guarantee of customer satisfaction.

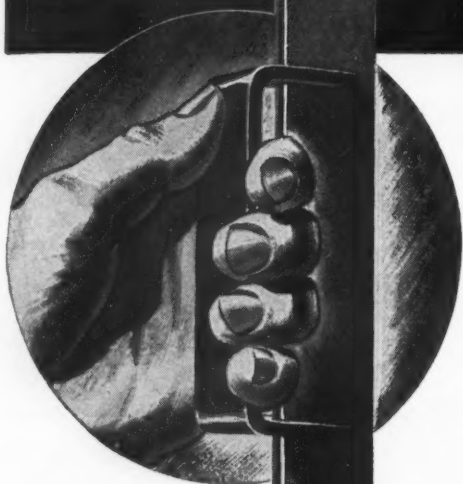
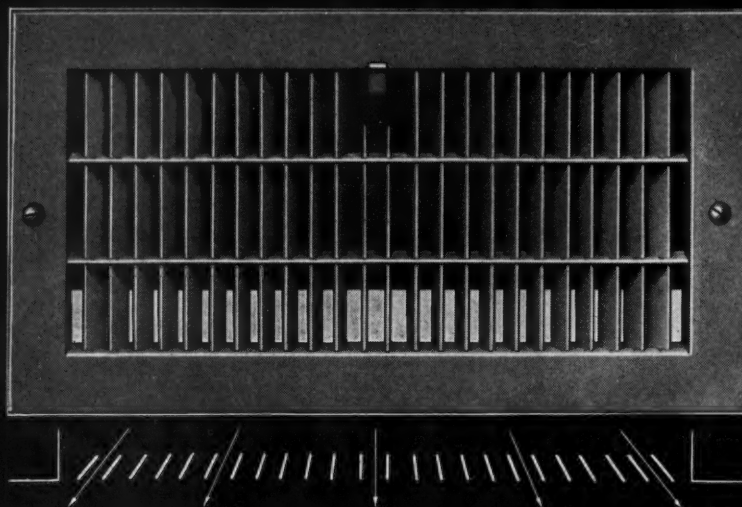
Get your copy of the new High-Low descriptive folder. Write Dept. A.

**VIKING AIR CONDITIONING CORPORATION**

MAIN & CENTER STREETS • CLEVELAND, OHIO

# INDEPENDENT "FABRIKATED" *Adjustable* DIRECTED AIR FLOW REGISTERS AND GRILLES

**EVERY  
GRILLE BAR IS  
INDIVIDUALLY  
ADJUSTED**



*Handy Two-  
Prong Tool  
Accompanies  
Each Shipment*



338

ONLY with individually adjusted grille bars can air flows be directed with the precision required in present day air conditioning. Innumerable effects otherwise impossible can be easily attained with Independent "Fabrikated" Adjustable Directed Air Flow Registers and Grilles. After the register or grille is in place—and without taking it out—adjustments can be made until exactly the right result is achieved. The two-prong special tool which accompanies each shipment turns the grille bars with ease, and they remain securely in position without locking.

Independent "Fabrikated" Adjustable Directed Air Flow Registers and Grilles are made in any size with either vertical or horizontal grille bars to deflect air flows right or left, or up or down; also with deflecting vanes added to give four-way direction to air flows.

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## THE INDEPENDENT REGISTER CO.

3757 EAST 93RD STREET

CLEVELAND, OHIO



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## Makes a Difference

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You want to KNOW, even before you sign a contract, that all the confidence you and your customers can possibly have in what you sell will be more than supported by the product through all the years of anticipated service.

### WE KNOW WARM AIR HEATING!

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We have stuck consistently to Warm Air Heating because we *believed in Warm Air Heating* and we have been perennially alert to every advancement in our chosen field. *That is WHY we KNOW Warm Air Heating!* And the more recent developments in Forced-Air-Heating and Air-Conditioning have been amply contributed to by Meyer Engineering ability—a fact we are pardonably proud of.

Today WEIR-MEYER equipment is going into large and complicated air-conditioning installations as well as the more numerous "bread-and-butter" jobs. And in every section of America, today's sales are influenced by the service-records of Weir furnaces that have been on the job for 25, 30 and 35 years—and are still "going strong"!

Add to the above: Dealer co-operation on an EXCLUSIVE franchise basis that makes 25-year-old WEIR dealerships no rarity, and you have a set of convincing reasons WHY you should carefully consider WEIR-MEYER as the equipment upon which you plan to build YOUR reputation. The coupon, either signed or clipped to your letter-head, will bring full details.

**THE MEYER FURNACE COMPANY**  
PEORIA, ILLINOIS  
ESTABLISHED 1866

Manufacturers of  
**WEIR and MEYER**  
Furnaces and Air Conditioning Equipment  
for Coal, Gas or Oil . . . . .



**THE MEYER FURNACE CO., Peoria, Ill.**

Please send WEIR-MEYER dealership details.

Name .....

Address .....

City ..... State.....

**WHEN YOU NEED COPPER..**

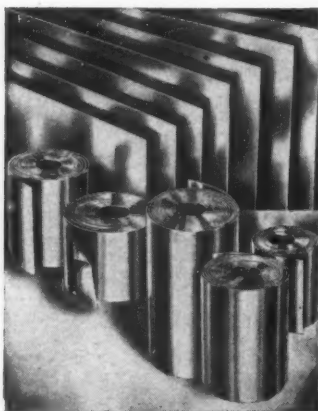


**Contact HUSSEY**

**THERE'S A SALES AND WAREHOUSE SERVICE NEAR YOU**

*All Hussey Warehouses  
now carry stocks of  
Copper-Armored*

**SISAL KRAFT**  
1-2-3 oz. weights



With a nationwide network of Hussey Warehouses and Sales Offices at your immediate beck and call, you need not worry about copper deliveries in any quantity, large or small. Neither will you find it necessary to maintain large copper inventories—thanks to the complete warehouse stocks of Hussey Copper provided the year around for your requirements.

Avail yourself of this modern copper service—built up by more than 90 years of specialization in the manufacture and distribution of copper in every commercial form—a service as near and convenient as your telephone.

**C. G. HUSSEY & COMPANY**

(Division of Copper Range Co.)

Rolling Mills and General Offices:

PITTSBURGH, PA.

**Copper HUSSEY Brass**



# "CRESTOLOY"

## THE SYMBOL OF GREATER VALUE IN PLIERS



Tool users and tool buyers who are critical of values make a real discovery when they first try Crestoloy Pliers.

Crestoloys are not ordinary pliers in any sense of the word. They are visibly different in terms of their lighter, trimmer, streamline design. This design is possible because of the steel itself, which is Crescent's own special analysis. Exact-ing factory methods guard every step in manu-facture. Then each individual Crestoloy Plier runs a gauntlet of the toughest tests any tool maker ever devised. Only those pliers that suc-cessfully pass these tests get the Silver and Blue Crestoloy Tag which is affixed to every Crestoloy tool that leaves the plant.

Make this tag your measuring stick of plier value. Insist on Crestoloy performance. You will find these pliers represent a value not even approached by ordinary tools.



Genuine Crestoloy Pliers can be identified by this blue and silver tag attached to every tool.

### EVERY CRESTOLOY PLIER IS INDIVIDUALLY TESTED

After cutting a piece of hardened plow steel wire in this Testing Machine, every Crestoloy Cutting



Plier must then cut cleanly through a strip of .003" bond paper so that the end drops free.

**CRESCENT TOOL COMPANY**  
JAMESTOWN, N. Y.

30-135



*Three ways*  
**U·S·S GALVANIZED  
 COPPER STEEL SHEETS**  
*help to Improve your Business*

**T**HE use of U·S·S Galvanized Copper Steel Sheets for duct work, housings and heating systems, holds a three-fold advantage for the sheet metal man. This material is easier to handle. The base metal is uniform in size, gage, ductility.

Steel products bearing the U·S·S label are readily accepted by architects, builders, owners. Your clients know that they are getting the best in steel when they see this label.

And when you use U·S·S Galvanized Copper Steel, its longer life aids in building a reputation for quality work. Should the galvanizing become scratched, corrosive elements have less chance of getting a foothold when the base metal is U·S·S Copper Steel.

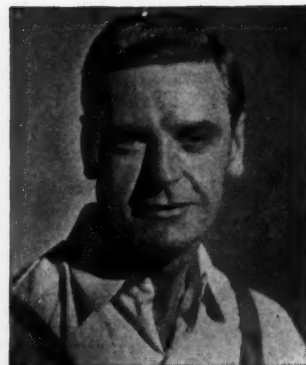
Use U·S·S Galvanized Copper Steel on your next job. We will gladly send you further information about this superior metal. Write to one of the companies listed here.



CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago  
 COLUMBIA STEEL COMPANY, San Francisco  
 TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham

Scully Steel Products Company, Chicago, Warehouse Distributors • United States Steel Products Company, New York, Export Distributors

**UNITED STATES STEEL**



**THEY MEAN FASTER WORK**

*"I like the way sheets of U·S·S Galvanized Copper Steel handle. They speed up fabrication . . . make intricate bends and turns easier . . . mean neat, tight seams, good looking ducts."*



**THEY'RE EASIER TO SELL**

*"The first thing I look for on sheets is the U·S·S Label. Duct work bearing this label is easier to sell. My clients recognize the name—and have confidence in it."*



**THEY BUILD REPEAT SALES**

*"My clients 'stay sold' when I use U·S·S Galvanized Copper Steel for duct work. Its longer life builds good-will . . . results in plenty of repeat trade."*





## "DON'T BE A MULE ABOUT FILTERS, JOE"



**JOE:** Look. You go peddle your fish somewhere else, Little Fellow. There's not enough profit in air filters for me to bother with.

**LITTLE GUY:** Guess you haven't heard the latest dope, then.

**JOE:** I guess not. What is it?

**LITTLE GUY:** The Dust-Stop filter people are hopping into the magazines with a wow of a campaign on filter-change and the advantages of filtered warm-air heat.

**JOE:** Sounds good. When does it all start?

**LITTLE GUY:** It starts August 12, in some of the best magazines there are for selling filters and furnaces—American Home, Better Homes and Gardens, Saturday Evening Post, and Life.

**JOE:** Boy, that is a list! What are the ads like?

**LITTLE GUY:** Big ads with guys like me in 'em that tell how great warm-air heat is, and how you have to change filters regularly to get the most out of it. And, Joe...

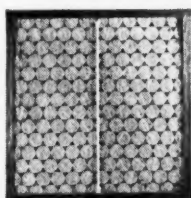
**JOE:** Go on.

**LITTLE GUY:** And, Joe, folks are going to change filters when they find out it saves them dough to do it.

**JOE:** But will they get those Fiberglas Dust-Stop Filters from ME?

**LITTLE GUY:** Sure, if you co-operate. Send out the free post cards we've got for you. Phone every man you know who has a forced, warm-air furnace. You'll get loads of business.

**JOE:** You bet I will. I'm going to start phoning NOW!

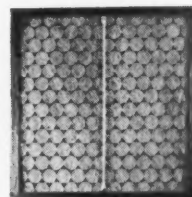


*You can make a lot of extra money this year on*  
**FIBERGLAS\* DUSTOP\* AIR FILTERS**

ST. M. REG. U. S. PAT. OFF.

*Manufactured by Owens-Corning Fiberglas Corporation, Toledo, Ohio*

**See Fiberglas at the Fairs—New York and San Francisco**



**APPLAUSE**  
*from every angle..*

# FITZGIBBONS DIRECTAIRE CONDITIONERS *have clicked*

Everybody likes them. Heating contractors, oil burner dealers, stoker dealers, gas burner dealers, unite in praising Directaire simplicity, easy installation, easy servicing, gratifying performance. Builders enthuse about the favorable reaction of home-buyers. Owners glow over low fuel costs, and dependably uniform, direct-fired, air conditioned comfort. The Directaire has "clicked"!

This page of pictures offers overwhelming evidence of Directaire adaptability to all conditions of space, fuels, firing method. Get *all* the facts about this conditioner and the scientific correctness of its design. Write us.

**Fitzgibbons Boiler Company, Inc.**

Air Conditioning Division: 101 PARK AVENUE, NEW YORK  
Works: OSWEGO, N. Y.

Branches and Representatives in Principal Cities

**WRITE-NOW**  
*for this catalog  
and complete data*





REGULAR ORDERS . . . SPECIAL ORDERS . . . RUSH ORDERS . . .

they all get *"Scully Service"*

ALLOYS  
ANGLES, HOT ROLLED and COLD ROLLED  
ARCHES (CORRUGATED)  
BABBITT  
BANDS and HOOPS  
BARS, HOT ROLLED  
ALLOYS (HR and CF)  
COLD FINISHED  
ELECTRIC HIGH CARBON STEEL REINFORCING  
BEAMS and C. D. SECTIONS  
BEEF RAIL  
BOLTS, NUTS, WASHERS, ALL KINDS  
BORING and TURNING BARS and GRINDERS  
BRACES, BOILER  
CHAIN, ALL KINDS  
CHANNELS  
CHISELS  
CHUCKS, STAYBOLT  
CLAMPS, BOILERMAKERS  
CLIPS, PATTERSON  
CLEANERS, FLUE  
CONDUCTOR PIPE  
COPPER and BRASS  
COUPLINGS, HOSE  
CRAYONS, SOAPSTONE  
CUTTERS  
DARDELET RIVET and MACHINE BOLTS  
DRILL RODS  
EAVE TROUGH and FITTINGS  
EXPANDERS, FLUE  
FERRULES, COPPER  
FLANGES, BOILER and TANK  
FLOOR PLATES  
GALVANIZED SHEETS, BARS, BANDS, ETC.  
HANDLES, HAMMER  
HEADS, TANK and FLANGE  
HOISTS, HAND and POWER  
IRON, STAYBOLT  
LUGS, BOILER, TANK and SILO  
MACHINERY, HAND and POWER  
MANHEAD PLATES and FITTINGS  
NAILS  
PACKING  
PAINT STICKS  
PLATE STEEL, STANDARD QUALITIES  
ABRASION RESISTING  
COR-TEN and MAN-TEN  
PLUGS, FLUE  
RAILS and FITTINGS  
REAMERS  
SHAFTING  
SHEETS  
ABRASION RESISTING  
ELECTRICAL  
COR-TEN and MAN-TEN  
HOT ROLLED and UNIFORM BLUE  
WELLSVILLE POLISHED  
COLD ROLLED  
STAINLESS STEEL  
GALVANIZED and GALVANNEALED  
LONG TERNE  
CORRUGATED  
U-S-S COPPER STEEL  
SPRING STEEL BARS and SHEETS  
STAINLESS STEEL  
STRIP STEEL, CR and HR  
TEES  
TIRE, ROUND EDGE  
TOOLS, HAND and POWER  
for BOILER and IRON WORK  
TROLLEYS  
TUBES, BOILER  
TURNBUCKLES  
VALVES, BLOW-OFF  
WELDING ROD and WELDERS  
ZEES



THE name "Scully" has become a synonym in the steel business for prompt, friendly service. A constantly growing list of customers—today totalling many thousands—has learned that no matter how small or how large an order may be it will always get the same treatment from Scully. Each of our 8 conveniently located warehouses works on the principle that customers want friendly contacts and prompt deliveries. If you're not one of our customers now, "Call Scully" the next time you need steel, steel products, copper or brass. And if you do not have a copy of our handy Stock List and Reference Book, be sure to ask for one—it's free, of course.



"Just a line to let you know how much we appreciate the handling of our above order number. This order was telephoned to your office late yesterday evening and the material was received at our plant about 1:30 P.M. today. Assuring you that this service is very much appreciated and one we will remember, we are . . ."

## SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

Warehouses at

CHICAGO • NEWARK, N. J. • ST. LOUIS • BOSTON • ST. PAUL—MINNEAPOLIS  
CLEVELAND • PITTSBURGH • BALTIMORE

UNITED STATES STEEL



When you want same-day  
shipment of standard size  
**TONCAN IRON SHEETS**  
in the popular gauges — call  
the nearest distributor listed  
below. He is prepared to give  
you up-to-the-minute service.

#### ALABAMA

Birmingham.....Arnold Supply Company  
Mobile.....Mobile Steel Company

#### ARKANSAS

Texarkana.....Buhrman-Pharr Hardware Co.

#### CALIFORNIA

Los Angeles.....Ducommun Metal & Supply Co.  
Los Angeles.....Union Hardware & Metal Co.  
San Francisco.....Ducommun Metal & Supply Co.

#### COLORADO

Denver.....Goldberg Brothers

#### CONNECTICUT

Bridgeport.....Hunter & Havens  
Hartford.....Ensworth & Son, Inc., L. L.  
New Haven.....New Haven Plbg. & Supply Co.  
Stamford.....Sheet Metal Mfg. Co., Inc.  
Waterbury.....Weyand Company, Inc., Henry

#### DISTRICT OF COLUMBIA

Washington.....Noland Co.

#### FLORIDA

Jacksonville.....Cameron & Barkley Co.  
Miami.....Cameron & Barkley Co.  
Tampa.....Eagle Rfg. & Art Metal Works  
West Palm Beach.....Roofing & Sheet Metal Supply Co.

#### GEORGIA

Atlanta.....Atlantic Sheet Metal Corp.  
Savannah.....Atlantic Roofing & Supply Co.

#### ILLINOIS

Chicago.....Barnes Metal Products Co.  
Chicago.....Chicago Steel Service Co.

#### INDIANA

Evansville.....Ohio Valley Hdw. & Roofing Co.  
Indianapolis.....Tanner & Company

#### IOWA

Des Moines.....Iowa Steel Warehouse Co.  
Ottumwa.....Haw Hardware Co.

#### KENTUCKY

Louisville.....Stratton & Terstegge Co.  
Louisville.....Todd-Donigan Iron Co.

#### LOUISIANA

New Orleans.....Jones Co., J. Wilton

#### MAINE

Bangor.....Bragg & Sons, N. H.  
Lewiston.....Hall & Knight Hardware Co.  
Portland.....Blake, W. L. & Company

#### MARYLAND

Baltimore.....Conway, William A.

Baltimore.....Kahl-Holt Company

Baltimore.....Milcor Steel Co.

#### MASSACHUSETTS

Boston.....Avery & Saul Co.  
Boston.....Berger Manufacturing Co.  
Boston.....Herrick Co.  
Boston.....Ryerson & Son, Inc., Joseph T.  
Cambridge.....Austin-Hastings Co.  
Cambridge.....Lamb & Ritchie Co.  
Greenfield.....Aird-Don Co.  
Lowell.....Lowell Iron & Steel Co.  
Springfield.....Lewis Company, Chas. C.  
Springfield.....Millar & Son Co., Chas.  
Worcester.....Merrill & Usher Co.

#### MICHIGAN

Bay City.....Jennison Hardware Co.  
Detroit.....Buhl Sons Company  
Detroit.....Mahon Company, R. C.  
Grand Rapids.....Behler-Young Company

#### MINNESOTA

St. Paul.....Paper-Calmenson Co.

#### MISSOURI

Kansas City.....Townley Metal & Hardware Co.  
St. Louis.....Burger Mfg. Co.  
St. Louis.....Hammond Sheet Metal Co.  
St. Louis.....Tiemann Hardware & Supply Co.

#### NEBRASKA

Omaha.....Gate City Iron Works

#### NEW JERSEY

Jersey City.....N.Y. Iron Rfg. & Corrugating Co.  
Newark.....Dunphy-Smith Co.  
Trenton.....Trenton Sheet Metal Supply House

#### NEW YORK

Albany.....Aird-Don Co.  
Binghamton.....Binghamton Hardware Co.  
Binghamton.....Millar & Son Co., Chas.  
Brooklyn.....Atlas Supply Co.  
Brooklyn.....K. & S. Metal Supply, Inc.  
Brooklyn.....Sheet Metal Mfg. Co., Inc.  
Buffalo.....Beals, McCarthy & Rogers, Inc.  
Plattsburg.....Aird-Don Co.  
Rochester.....Case & Son Mfg. Co., W. A.  
Rochester.....Milcor Steel Co.  
Syracuse.....Case & Son Mfg. Co., W. A.  
Utica.....Millar & Son Co., Chas.  
Troy.....Warren & Company, J. M.

#### NORTH CAROLINA

Charlotte.....Hajoca Corporation  
Greensboro.....Odell Hardware Co.

#### OHIO

Canton.....Berger Mfg. Co.

Canton.....Milcor Steel Co.

Cincinnati.....Dieckmann Co., Ferdinand

Cincinnati.....Moise Steel Co. of Ohio

Cleveland.....Betz-Pierce Co.

Cleveland.....Decker-Reichert Steel Co.

Cleveland.....Kinsner Supply Co.

Columbus.....Palmer-Donavin Mfg. Co.

Dover.....Reeves Steel & Mfg. Co.

Tiffin.....Tiffin Art Metal Co.

Toledo.....Bostwick-Braun Co.

#### OREGON

Portland.....H. B. Davis Iron & Steel Co.

#### PENNSYLVANIA

Easton.....H. P. Kinsey  
Erie.....Erie Concrete & Steel Supply Co.  
Harrisburg.....Herre Brothers  
Philadelphia.....Berger Brothers Co.  
Philadelphia.....Berger Mfg. Co.  
Philadelphia.....Carter-Donlevy Co.  
Philadelphia.....Fable & Co., Inc.  
Philadelphia.....Hall & Carpenter  
Philadelphia.....Hyatt & Co.  
Philadelphia.....Obdyke, Inc., B. P.  
Philadelphia.....Potts, Son & Company, W. F.  
Pittsburgh.....Steel Products Co.

#### RHODE ISLAND

Providence.....Cartier & Sons Co., M. N.

#### TENNESSEE

Chattanooga.....Vance Iron & Steel Co.

#### TEXAS

Fort Worth.....Fort Worth Structural Steel Co.  
Orange.....Sabine Supply Co.  
San Antonio.....San Antonio Machine & Supply Co.

#### UTAH

Salt Lake City.....Zion's Co-operative Merc. Inst.

#### VERMONT

Burlington.....Blodgett Supply Co.  
St. Johnsbury.....Millar & Son Co., Chas.

#### VIRGINIA

Lynchburg.....Handy Company, N. B.  
Norfolk.....Tidewater Supply Co.  
Richmond.....Southern Railway Supply Co.  
Roanoke.....Dominion Metal & Culvert Corp.

#### WASHINGTON

Seattle.....Seattle Hardware Co.

#### WISCONSIN

La Crosse.....Badger Corrugating Co.  
Milwaukee.....Gibbs Steel Co.  
Milwaukee.....Milcor Steel Co.

# TONCAN IRON SHEETS

An alloy of refined open-hearth iron, copper and molybdenum—that grows old slowly

Manufactured by

**REPUBLIC STEEL CORPORATION**

General Offices: Cleveland, Ohio

**REPUBLIC STEEL**  
UNION DRAWN STEEL DIVISION  
BERGER MANUFACTURING DIVISION  
NILES STEEL PRODUCTS DIVISION  
TRUSCON STEEL COMPANY  
STEEL AND TUBES, INC.





## The Michigan State Heating Code

IN 1931, when American Artisan first suggested licensing and heating codes as a possible means of eradicating improper practices which, even then, had crept into the warm air heating and winter air conditioning industry, the editors visualized these codes in terms of local ordinances only. We did not, then, foresee that state codes would be suggested as a possible method of getting a code into force over a large area in a short time.

Since 1931, a few states have drawn up proposed state ordinances. New York, for example, has had a furnace contractor ordinance before the state legislature two or three times. Fortunately for our industry, the proposed bill has been defeated because our industry pointed out that the bill takes control completely out of the hands of the contractors most concerned.

Illinois had a state code up to third reading a short time ago and proposes to submit a revised bill as soon as possible.

Michigan has a bill ready for the legislature. We publish Part 1 of the Michigan code in this issue and will complete publication as rapidly as possible.

We urge every man in warm air heating and winter air conditioning to study carefully this Michigan law. If the bill is passed the Michigan law will likely become the foundation for other similar state codes and as such should be as satisfactory as possible.

The editors, frankly, have, up to date, been somewhat dubious about the merit of a state code. In our contacts with local ordinances, with contractors operating under such codes, with inspectors who must enforce these local laws (Ft. Wayne, Toledo, Minneapolis) it has seemed to us that any ordinance is only as good as its enforcement. If the inspector is energetic, honest, thoroughly versed in heating and air conditioning; if the contractors are in favor of the code and all cooperate; if the city officials look upon their code as a means of giving their citizenry more satisfactory heating and not as just another source of revenue—the code is workable and a definite benefit to home builders.

These things being so, it seems, offhand, that a state code can be an unwieldy, difficult to enforce, wasteful ordinance and inspection a practically hopeless task. Readers who studied inspector Furge's report on Ft. Wayne in the January, 1939, issue can appreciate the difficult task confronting

the inspector. Multiply such a local problem by the area of a state or a district and inspection seems a gigantic problem.

However, in studying the proposed Michigan ordinance, there appears to be a considerable number of features of real merit in a state code. First of all, and highly important, is the fact that with such a state law the home owner has a sound legal basis for instigating suit against an installer who has incorrectly designed or improperly installed a heating system. Heretofore, it has been practically impossible to prove, in court, that an installation was improperly designed or installed.

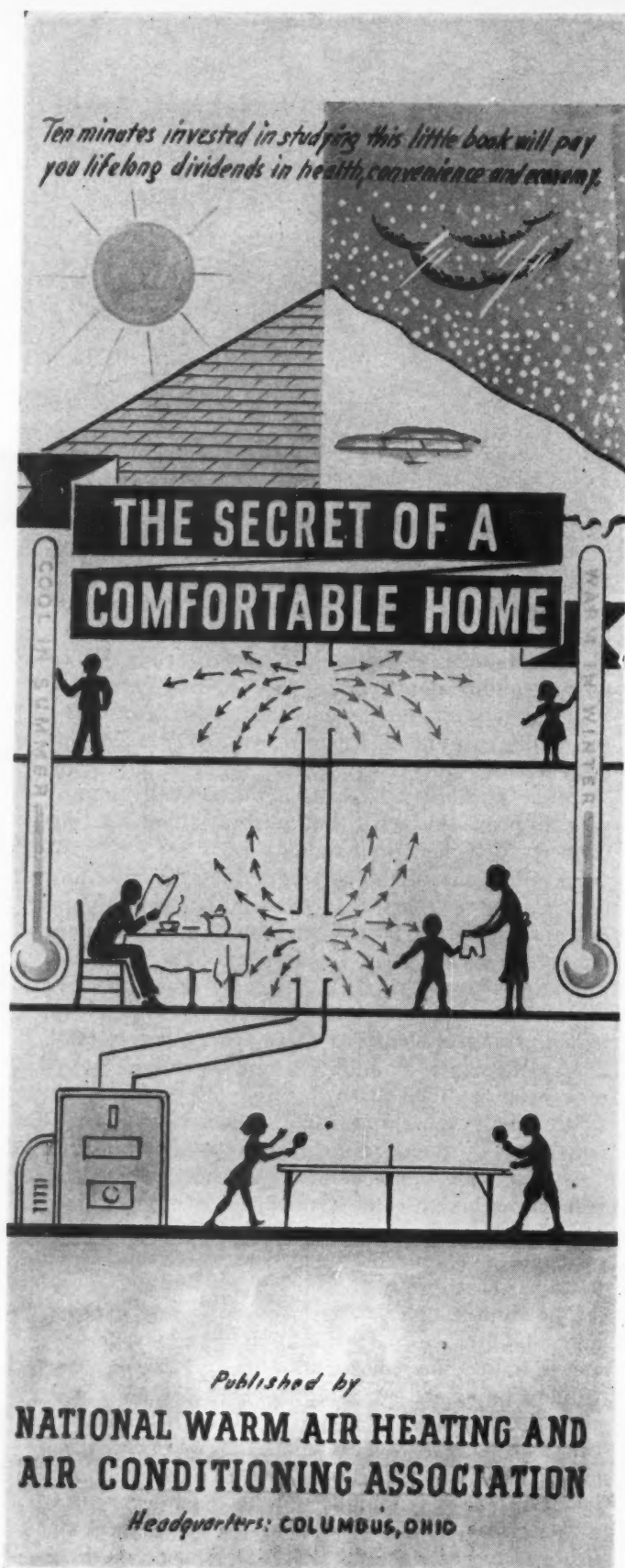
Secondly, the Michigan law divides the state into districts for the purpose of licensing, inspecting and examining so that no one inspector or enforcement committee has an area too large to supervise. We are still inclined to feel, however, that any area which has a large city or several fair sized cities, *without sustaining local codes*, can prove a hopeless task unless there are a number of inspectors and they may be a financial drain during slack seasons.

We like, very much, the proposed state board consisting of a recognized heating authority, State Fire Marshall, representative of the underwriters inspection bureau and a member of a recognized association or group from each district. In that clause there should be the answer to—"why belong to an association?"

The routine of granting licenses, taking out permits, holding examinations, making inspections, etc., is much the same as the local ordinances previously published in American Artisan. We like, also, the use of the Standard Code and the Technical Code with modifications as the basis for all design. And we like, too, the section which establishes an individual holder of a license in every firm, *with no firm license*, plus two classes of license—one for gravity systems only and a second for mechanical systems—with yearly renewal, and with a surety bond, with the added suggestion that every plan or proposal submitted should carry the name of the licensee.

This proposed Michigan state code is worth study. There are no extra copies available, so far as we know, so readers interested should save their copies. No doubt there will be numerous questions and suggestions. The editors will be glad to forward to the proper authorities all such correspondence.





Above is a reproduction of the front cover of the new consumer booklet. Mr. Ames, the author, calls attention to the fact that this is not intended to be a technically correct drawing of a modern heating system, but, rather, a pictorial cover in the style of the cartoon illustrations used inside the book.

# The National Warm Air Assn's. New Consumer Booklet

By Allan P. Ames

Public Relations Counsel for the Association

THE decision of the directors at the Chicago mid-year meeting to publish a consumer booklet marks an important step in the progress of the National Warm Air Heating and Air Conditioning Association. The success of a trade association can be measured by the number of jobs it finds to do for the general benefit of its membership. Production of sales literature suitable for the use of members has become an important function of many of the most prosperous trade groups.

The directors made this decision only after a lot of preliminary work. At the Cincinnati convention in December Ames & Norr, the new Association Public Relations Counsel, was instructed to investigate the whole matter of a cooperative consumer booklet. Before the text could be written it was necessary to consult a large number of manufacturers and to reconcile a variety of ideas. The text finally submitted to the directors at Chicago was the result of discussion and compromises. All this preliminary work, however, has proved worthwhile and the association is going to have a booklet of great potential sales value.

It is intended that the booklet shall reach the ultimate consumer through the local heating and air conditioning contractor, who will get it from the manufacturer, or manufacturers, whose products he handles. The manufacturer members of the Association will distribute the booklets to their retailers, as they see fit. The Association will not attempt to control further distribution once the booklet has passed into the hands of members.

A small sample edition is now being printed and samples will be sent to all the members of the Association during July, unless printing is unexpectedly delayed by the art work.

This will be a low price book, but it will not be a "cheap" book. By printing a large edition the association will be able to sell booklets to members for not to exceed two cents a copy, including the cost of imprints. The price will be slightly less for large orders.

The basic idea is to print a piece of selling literature showing householders why they should buy warm air heat in preference to other types. Many of our members have published excellent descriptive booklets and folders about their own units, but the

industry needs something that will put behind every company's individual sales efforts the powerful drive of our cooperative research. The ultimate consumer, befuddled by competitive claims, is impressed by authoritative statements from a non-commercial source like the University of Illinois.

The title of the booklet is "The Secret of a Comfortable Home." It tells the reader briefly, but clearly and in non-technical language, why a warm air installation with modern appurtenances will enable him to keep his home supplied with purified air of the right degree of humidity, warmed in winter and cooled in summer at the least cost.

The booklet will be of suitable size for mailing in a No. 10 envelope, 4 by 9 inches inclusive. It will be twelve pages, printed on heavy white stock in two colors, dark blue and red. Illustrations will be of cartoon style. The front cover will show a dia-

gram of a house with the hot summer sun shining on one side of the roof and a winter snowstorm beating on the other half. Beneath the roof a typical American family will be going about the business of daily living in ideal comfort thanks to the warm air furnace in the cellar equipped with up-to-date appliances for air conditioning.

The back cover page will be left blank for the imprints of individual manufacturers or dealers and there will be an additional inside page on which users of the booklet can print their own house advertisements.

The right to use the booklet will, of course, be limited to members of the Association. Through the printing of a large edition these members will be able to buy the book for considerably less than they would have to pay for a similar piece of selling literature designed for their exclusive use.

## Philadelphia Assn's. Petition for a Code

Groups interested in getting a heating and licensing ordinance in force in their city may be interested in the wording used by the Philadelphia association. This petition admirably sets forth why such an ordinance is beneficial to the home owner or builder.

### CITY COUNCIL, CITY OF PHILADELPHIA, PA.

**We the undersigned** citizens and taxpayers of Philadelphia, Pa., with permanently located business establishments, and with long practical experience and mechanical ability, engaged in the **Roofing and Insulating; Sheet Metal; Warm Air Heating; Forced Air and Air Conditioning** business, to give proper long lasting mechanical service to the home and building owners in the City of Philadelphia—hereby beg leave to call to your attention the:—

1. Existing and increasing number of fire hazards.
2. The increasing number of unsafe and dangerous conditions at battlement walls between properties; chimneys and skylights.
3. The hazardous conditions at heater smoke pipes; their insecure fastening and supports and their close proximity to structural woodwork; the unsafe method of entering the smoke piping into the chimney in the basement; the improper mounting of heaters that allow fuel gas to escape into the house or building endangering the health, safety and life of the occupants, and the improper method of sizing and installing the heat supply and providing the required amount of air supply to the discomfort of the occupants and waste of fuel with the consequent unnecessary excessive high temperatures in the heater and chimney flue.

Due largely to the non-mechanical and irresponsible itinerant handy man who makes repairs and renewals without regard to the established Philadelphia Building Code; Laws, Ordinances, rules and reg-

ulations established by City Council to govern building construction and repair, and against the rules of the Fire Marshal and Bureau of Building Inspection, which the permanently established responsible contractors endeavor to uphold.

We, therefore, the undersigned, suggest as a remedy for this condition and to prevent its continuance, that the City Council under the power granted by the State Legislature, to issue ordinances and rules for the protection of the safety, health and comfort of the citizens of Philadelphia, consider the Licensing of the Roofing, Sheet Metal & Warm Air Heating; Forced Air and Air Conditioning trades for work at or in dwellings and buildings, as proposed in the suggested Ordinance and rules herewith accompanying this petition, and thereby add from 300 to 500 experienced employers to police such work at no added expense to the City or to the dwelling or building owner and largely prevent these irresponsible so-called roofers and heating contractors from "swindling" the public with inferior and less material than specified and required by Ordinance, at a very low cash payment with no intention to provide an equal benefit to the owner; giving a fictitious name and address; pay no taxes and have no responsibility or permanent place of business.

Signed,

Name Business Address Owner or Officer

\_\_\_\_\_  
\_\_\_\_\_



## *The Proposed*

# Michigan State Licensing Ordinance

The proposed Michigan State Licensing Ordinance for warm air heating and air conditioning contractors, of which part one is published in this issue, was sponsored by the Michigan Sheet Metal & Roofing Contractors' Assn. together with a number of local associations. The ordinance is now (May 22), according to state association secretary Frank E. Ederle, in the hands of the Senate State Affairs Committee, but because of the lateness of submittal it looks as though nothing will be done about the bill during this session. In any event the ordinance will be ready for submittal at the beginning of the 1941 legislature. Since extra copies are not available, we suggest that interested readers file issues. Because this is the first complete state code, the ordinance and its proposals should be of interest to everyone.

### Air Conditioning Act

**A**N ACT for safeguarding persons and property and promoting public welfare; creating a Warm Air Heating and Air Conditioning Administrative Board of the State of Michigan and prescribing its duties; establishing standards for the installation of gravity warm air heating systems, mechanical warm air heating systems, semi-air conditioning systems, air conditioning equipment; providing for the state-wide inspection of installations of gravity warm air heating and air conditioning equipment; providing for the licensing and bonding of firms or corporations engaged in the business of installing gravity warm air heating and air conditioning equipment; providing penalties for the violation of this act; and repealing all acts or parts of acts in conflict with this act.

#### The People of the State of Michigan Enact Section 1. Scope.

The provisions of this act shall apply to the complete installations of gravity warm air heating systems; air conditioning systems or combinations thereof; in connection with all public or private buildings provided that this act shall not apply on the above work where the heat loss shall be in excess of 300,000 B.T.U. on any one system; or to any parts of the gravity warm air heating and air conditioning installations which are definitely assigned by statute to other trades. The term "Winter Air Conditioning" shall mean and include the simultaneous control of temperature, humidity, movement and purity of the air.

#### Section 2. Administrative Board Created.

There is hereby created the gravity warm air heating and air conditioning administrative board of the State of Michigan hereinafter known as the "board" which shall consist of the state fire marshal, Professor Loren G. Miller, Head, Dept. of Mechanical Engineering, of the college of engineering of Michigan State College and seven other resident members, citizens of the United States, appointed

by the governor as follows: one representative of an underwriters inspection bureau operating in the state; one person from each of the hereinafter described districts of the State of Michigan, who is a representative of a recognized association of persons or firms engaged in the business of gravity warm air heating and/or air conditioning. The terms of the appointive administrators shall be for a period of four years except that, in the first instance, two administrators shall be appointed for one year; two administrators shall be appointed for two years; two administrators shall be appointed for three years and one administrator shall be appointed for the full four year term. Any appointed member may, for cause, be removed from office by the governor.

The members shall annually elect a chairman. Four members of the board present at any meeting shall constitute a quorum, but any action taken at any meeting shall require the affirmative vote of at least four members. The members of the board shall serve without compensation but shall be entitled to their actual and necessary expenses incurred in performing the duties of their office.

#### Section 3. Districts.

For the purposes of this act the State of Michigan shall be divided into five districts: District No. 1 shall embrace the entire northern peninsula of Michigan; District No. 2 shall embrace all that part of the southern peninsula lying north of the line forming the southern boundary of Manistee, Iosco, and the four intervening counties; District No. 3 shall embrace all the territory within the State lying south of the southern boundary of District No. 2 and west of the 87th meridian; District No. 4 shall embrace all the territory within the state lying south of the southern boundary of District No. 2 and east of the 87th meridian with the exception of Monroe, Washtenaw, Livingston, Oakland, Macomb and Wayne counties, which latter shall constitute District No. 5.

#### Section 4. Duties and Authority of the Board.

The board shall hold regular meetings quarterly and may hold special meetings on call of the chairman. The board

is hereby authorized and it shall be their duty to employ a chief inspector, deputy inspectors and other necessary personnel; to provide for the inspection of all work within the scope of this act; to provide for examinations for licenses and to delegate authority to the chief inspector, deputy inspectors, municipal or district boards of examiners appointed by this board; to grant licenses and issue certificates therefor to those applicants who shall show proper qualifications and have paid the prescribed fees; to examine persons who shall apply for inspectors certificates of qualification and to grant such certificates to those who have shown the proper qualifications and who shall have paid the prescribed fee; and to revoke or suspend any license or certificate for good and sufficient cause as provided in Section 18 of this act; and to adopt and issue the necessary orders and regulations for the enforcement of the provisions of this act. The board is hereby empowered to adopt and issue orders prescribing such rules and regulations as they may consider necessary for safeguarding the health, lives and property of persons governing the repair, alteration or extension of existing gravity warm air heating systems or air conditioning systems or the addition or attachment of any apparatus thereto, but which shall not be in conflict with any statute of this state.

### Section 5. Installation Standards.

All installations shall be in conformity with approved standards for safety to persons and property, the statutes of this state, orders issued by the board under the authority of this act, all applicable ordinances, the Standard Gravity Code, tenth edition, as approved and issued by the authority of the: National Warm Air Heating and Air Conditioning Association; American Society of Heating and Ventilating Engineers; National Association of Sheet Metal Contractors; National Board of Fire Underwriters; and the Technical Code for the design and installation of mechanical warm air heating systems, 2nd edition, approved and issued by the National Warm Air Heating and Air Conditioning Association are hereto appended and made a part of this act. The board shall prescribe and publish minimum standards for the alteration, repair or extension of existing gravity warm air heating and air conditioning equipment, or the attachment of any apparatus or equipment thereto, of all work within the purview of this act not otherwise definitely provided for. Changes of said standards may be made after a thirty day notice and public hearing, if requested. Notice of such proposed changes shall be given and publication of such changes shall be made in such manner as prescribed by the board.

### Section 6. Local.

The legislative body of any city or village may, by charter, ordinance and/or by action of its local board of rules prescribe reasonable rules and regulations to safeguard the standards of installation or the alteration, repair or extension of existing systems or the attachment of any apparatus or equipment thereto, provided they are not less than the minimum standards prescribed by the administrative board. Such city or village, upon adopting such rules, shall provide for the enforcement of the same and all inspectors engaged in the enforcement of such rules and regulations must hold warm air heating and air conditioning certificates of qualifications as provided in Section 16.

### Section 7. Duties of Inspectors.

It shall be the duty of inspectors employed by the board to make inspections of installations or alterations, repairs or extensions of existing warm air heating and air conditioning systems or the attachment of any apparatus or equipment thereto in the territory assigned to them except in municipalities where inspection has been established by ordinance and except as otherwise prescribed by this act. The deputy or municipal inspector having jurisdiction shall have the right during reasonable hours to enter any public or private building in the discharge of his official duties or for making any inspection or test of installations within the purview of this act; and is hereby authorized to order

the discontinuance of the use of faulty or hazardous equipment; and if the same is not repaired within such reasonable time as may be determined by the board, the inspector shall have the right to seal the heating unit or any part of said equipment which shall render the same inoperative.

### Section 8. Permits.

No gravity warm air heating or air conditioning equipment within the purview of this act shall be installed in any public or private building nor shall any alteration or addition be made in any such existing equipment, or any equipment or apparatus attached thereto, without first securing a permit therefor from the board or inspector having jurisdiction and paying the scheduled permit fee prescribed by the municipality or board except that no permit fee shall be required to execute any of the following classes of work; (a) Minor repairs as defined by the board.

Application for such permits describing the work to be done shall be made in writing in such form as may be prescribed by the board, by the person or firm contracting to do the work and shall be accompanied by the required fee. When the applicant has satisfactorily complied with these requirements a permit for such installation shall be issued provided that the said person or firm shall have no faulty work pending on which notice of violations had been given not less than ten days previously, and further provided that the issuance of such permit shall not be taken as permission to violate any legal requirement and no deviation shall be made from the work prescribed in the permit without the written approval of the inspector having jurisdiction.

### Section 9. License Required Before Issuance of Permits.

No permit for the installation or alteration of any work coming within the purview of this act shall be issued to any person or firm not holding a contractor's license, as defined in Section 12.

### Section 10. Permit Fees.

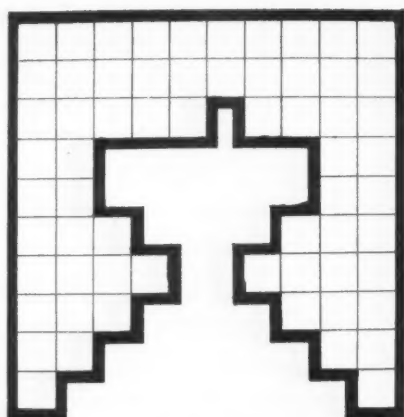
It shall be the duty of the board to establish a schedule of permit or inspection fees which shall be uniform throughout the state except that municipalities which have established gravity warm air heating and air conditioning inspection by ordinance may prescribe their own schedule of fees and retain same. Deputy inspectors shall remit to the board at regular intervals prescribed by the board all fees collected under the provisions of this act and shall make such reports on inspections made and fees collected as the board may direct.

### Section 11. Inspection and Certificates.

Whenever a gravity warm air heating and/or air conditioning installation, repair or alteration, authorized by the issuance of a permit, has been completed, it shall be the duty of the person or firm installing the same to notify the inspector having jurisdiction who shall inspect the work within a reasonable time. If the work conforms to the requirements established under this act, the inspector or the board having jurisdiction shall issue a certificate of approval. If the work is found not to conform to the requirements established under the authority of this act, the inspector shall send to the person or firm making the installation a written notice stating the defects which have been found to exist. Failure of any person or firm to repair work not in conformity with the requirements established under the provisions of this act within ten days of said notice shall require that the inspector or department having jurisdiction shall refuse further permits to said party and shall immediately demand of his surety that said work be made to conform to said requirements. Refusal of the surety to cause said defects to be repaired within ten days shall suspend said surety from the approved list of the board together with all persons or firms for whom they are surety.

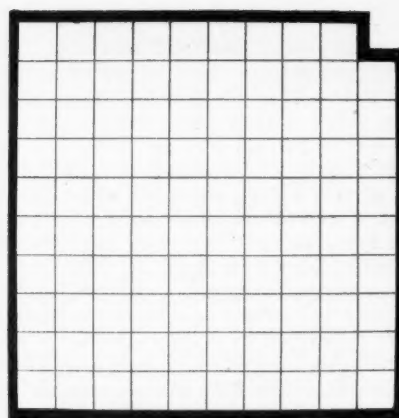
[Part 2 Will Follow]





GOLD DOLLAR

Fig. 1



PAY ROLL DOLLAR

Fig. 2

# The "Square Dollar" With the Movable Line

By Joseph G. Dingle, C.P.A.

Ottawa, Ill.

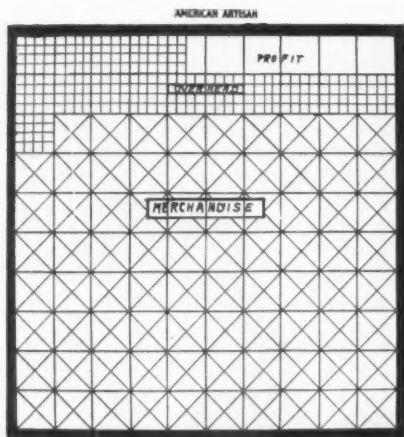
ONE usually thinks of the "dollar" as being round, or oblong. The silver dollar is round, and the paper dollar is oblong. Regardless of its physical shape, the business man's dollar MUST BE SQUARE. It must be an honest dollar; it should contain a fair profit after all elements of cost have been taken into consideration. There are many kinds of business dollars and before proceeding to a discussion of the "Contractor's Dollar" we shall present a few specimen dollars for consideration.

**The Gold Dollar:** This dollar (Fig. 1) used to contain one hundred cents, but the New Deal clipped thirty-seven cents out of the dollar. To present this new Gold Dollar, we have cut the heart out of the old dollar and now have something resembling a key. The business world certainly needs a key to unlock the tangled mess so that it may again function normally. We need some freedom of action in industry to permit the business man to use his dollars in the normal pursuit of his business.

**The Pay Roll Dollar:** The wage earner or the

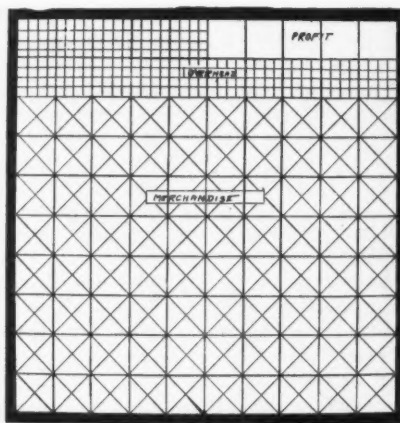
salaried worker still draws his compensation in dollars. The old one hundred cent dollar has been clipped for the Old Age Benefits (Fig. 2). It now is a ninety-nine cent dollar, and unless the Social Security Act is amended, the clipping will continue until there are only ninety-seven cents in the pay roll dollar.

**The Butcher's Dollar:** The butcher is one of our well known business men. We all patronize him and occasionally we wonder whether his prices are not a little too high. We here present the dollar (Fig. 3) as found in a typical butcher's cash register. It contains a merchandise cost of seventy-nine cents; an overhead cost of fifteen and one-half cents; and a profit (before compensation of the proprietor) of five and one-half cents. Certainly there is no over-charge in such a dollar. Through volume, the butcher's small profit percentage makes up his final year's profit—just five and one-half cents out of the sales dollar as return on his investment and for his services.



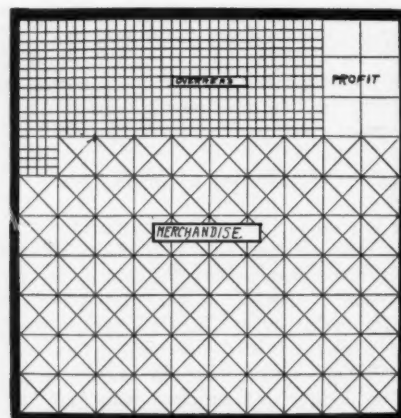
BUTCHER  
MERCHANDISE 79 - OVERHEAD 15½ - PROFIT 5½

Fig. 3



GROCER  
MERCHANDISE 80 - OVERHEAD 15 - PROFIT 5

Fig. 4



DRUGGIST  
MERCHANDISE 61 - OVERHEAD 25 - PROFIT 4

Fig. 5

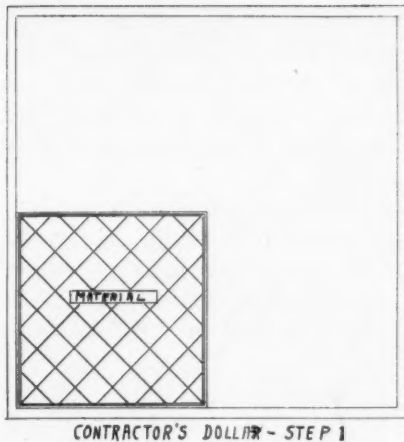


Fig. 6

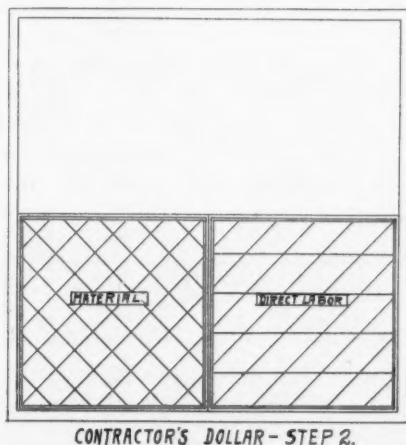


Fig. 7

**The Grocer's Dollar:** Here's another of our business friends with whom we all trade. He puts eighty cents worth of merchandise (at wholesale) with fifteen cents of overhead and five cents of profit, and we pay him a dollar. This is before compensation of the proprietor. This dollar (Fig. 4) is quite comparable with the butcher's dollar, and, in passing, we must admit that the grocer's dollar is a fair one, a square one.

**The Druggist's Dollar:** Here is also a business friend, and on account of a changed condition, we have a dollar (Fig. 5) containing less merchandise cost, but more overhead cost. Merchandise represents sixty-nine cents; overhead consumes twenty-five cents, leaving only six cents as profit—before considering compensation for the proprietor. His investment is somewhat greater than that of the grocer, and much greater than that of the butcher.

**A Contractor's Dollar:** By "Contractor" we mean any business man who must take raw material and direct labor, and with these elements fabricate or construct some article or object for his customer. Let's assume a set of plans and specifications as our starting point. The first step is to determine the material necessary for the work. We take off our materials and price them. We then can figure the direct labor cost necessary to convert the material into the desired form. In order to best present this dollar (Fig. 6) we shall use a square dollar composed of four equal squares. We do this for convenience, and do not wish to convey the idea that the four elements are equally represented in the dol-

lar. You know there is not a twenty-five per cent profit in the contractor's dollar.

After ascertaining our material cost and our direct labor cost, our contractor's dollar will look like an incomplete square (Fig. 7). There are two elements yet to be considered. We have so far only the foundation for a price—the prime cost, or, as is generally called, the direct cost.

One of the elements of cost, in fact the most elusive element, is that of overhead. We have many business men today who think they have little or no overhead, but these fellows are following the buffalo—they are rapidly disappearing. A great many have been converted to good cost records; the others will be taken care of sooner or later by the sheriff or the bankruptcy courts. We now erect the third square, Overhead, on the foundation squares of Material and Direct Labor (Fig. 8). Overhead must be computed on one or both of these direct costs. And still our dollar is incomplete.

Notwithstanding some present day discussions tending to show that the profit motive is wrong, we must have profit if we are to continue to live as a business unit. Even the Federal Government has failed to provide a W.P.A. for business. Of course the business man, after he goes broke and is no longer a business man, is eligible to the degree of W.P.A., but not before he divests himself of his business. We, therefore, must add the fourth element of the dollar—Profit—and now our dollar is a completed square. (Fig. 9). It has the required elements—Material, Direct Labor, Overhead and Profit.

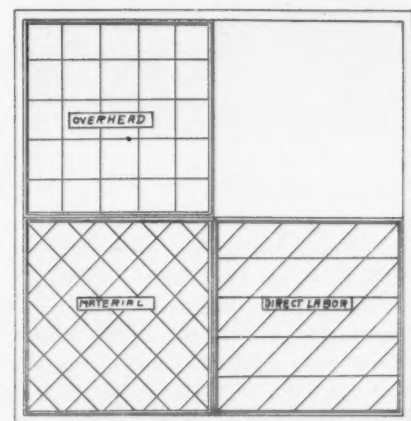


Fig. 8

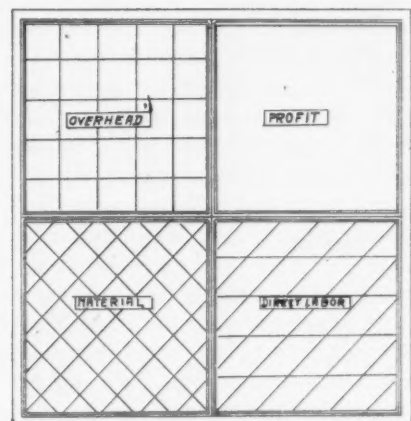


Fig. 9



Now that we have our Contractor's Dollar, let's see what it looks like. Remember, please, that the constituent parts are made of equal size for comparison purposes only. We find, first, that the profit element is one-fourth, or 25% of the dollar. On looking at this dollar from a cost point of view, we find the profit is one-third, or 33 $\frac{1}{3}$ % of the cost; that the profit is one-half, or 50% of the material and Direct Labor cost, or that the profit is equal to 100% of either of the three elements, Material, Direct Labor or Overhead.

#### That "Movable Line"

We are now ready to discuss the "Movable Line." It is the line separating Overhead from Profit. We will, for present purposes, admit that you can accurately determine the Material and Direct Labor Costs for each job or contract. These two costs make up the foundation on which your selling price

Of course, if your estimated sales volume is realized and your overhead costs are maintained, your percentage of overhead will remain constant. These two conditions are rarely realized, and it is this changing condition which so often causes a business loss.

For the purpose of illustrating this point, we here present a three-year record of a shop. (Figs. 10, 11, 12). In 1929, this shop had a sales volume of \$21,399.00, and Overhead Expenses of \$4,947.00. The 1929 sales dollar was composed of the following: (Fig. 10)

Material .....	35.50
Direct Labor .....	20.50
Prime Cost .....	56.00
Overhead .....	24.00
Profit .....	20.00
Sales Dollar .....	100.00

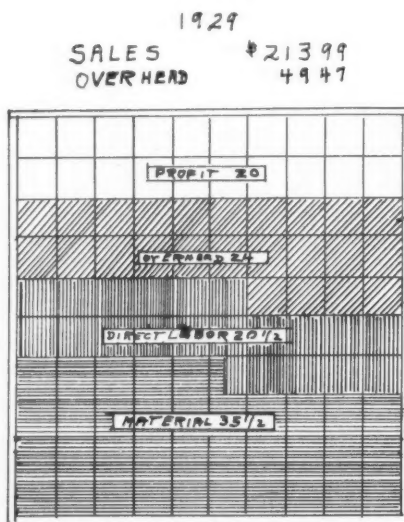


Fig. 10

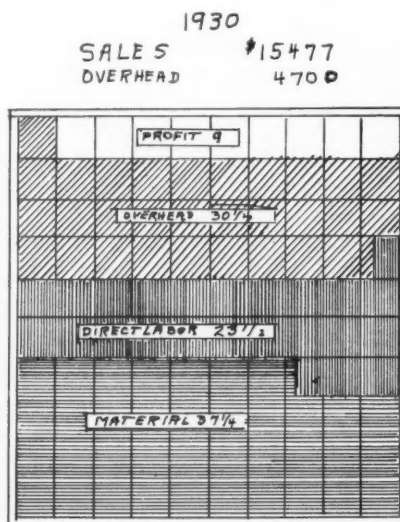


Fig. 11

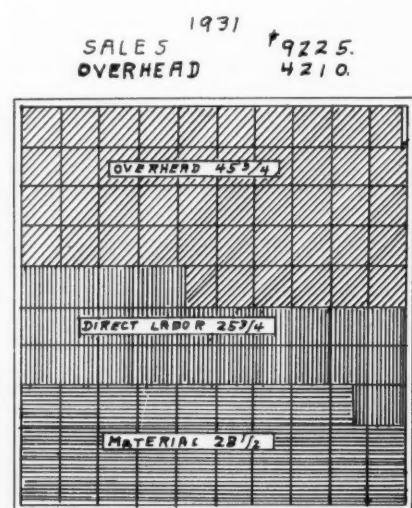


Fig. 12

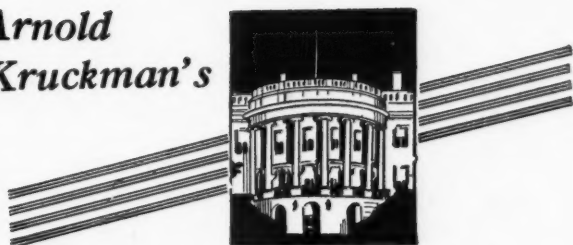
is based. We will admit your overhead is an "indirect" cost; that your "fixed" overhead expenses such as rent, lights, telephone, heat and office expense, are an annual total, and does not fluctuate directly in proportion to your sales volume. Let's assume you are one of the few business men who really know your operating costs. You may know that your average annual sales volume has been a certain figure for the past ten years. You may know your overhead expenses have averaged a certain total for the same period. Whether you realize it or not, you use prior performance records in estimating your costs, and for the first job you figure in January, you proceed on the theory that for prior years your volume has been so much; your overhead costs have been so much, and you use your prior percentages for computing overhead. How many of you really ask yourselves if your volume for the new year is likely to equal your prior year? You should realize that if your sales volume should be less than prior years, you will have fewer dollars over which to spread your overhead, resulting in an **increased percentage** of overhead in your sales dollar.

Let's try to visualize this shop early in January, 1930. Let's admit the proprietor was fully aware of the fact that his overhead in 1929 was equal to 24 cents in the sales dollar, or that for each 56 cents of material and direct labor, he must add 24 cents for overhead. He could not, in early January, 1930, know that his sales were going to fall some seven thousand dollars below the prior year. As the months passed, he could see that his sales volume was falling, and in an effort to prevent a loss, he did cut some two hundred dollars out of his overhead costs. But let's see just what his results were for 1930. (Fig. 11).

	1929	1930
Material .....	35.50	37.25
Direct Labor .....	20.50	23.50
Prime Cost .....	56.00	60.75
Overhead .....	24.00	30.25
Profit .....	20.00	9.00
Sales Dollar .....	100.00	100.00

(Continued on page 72)

**Arnold  
Kruckman's**



## Washington Letter

**"I**NDUSTRY and labor must get together to the end that our labor resources will be equal to the Nation's demands for the implements of preparedness, and equal to the tremendous production demands of war, should war overtake us." These words were publicly uttered during the past few days by Admiral Harold R. Stork, speaking for the Secretary of the Navy.

### Soldier-Mechanics

It is estimated that all soldiers in the next war must have some understanding of mechanics, because they will fight with more or less complex mechanical implements. The next war army will be composed of skilled and semi-skilled workers, ranging from 40% in some branches to 70% in others. And to support this highly mechanized army it will be necessary to provide industry with greatly augmented numbers of skilled and semi-skilled workers. For example, the Air Corps has been expanded recently to 50,000 men. It is estimated under war conditions the corps must be further expanded between 4 and 6 times, and that 70% of this military personnel must be skilled workers. At the same time under peace conditions the Air Corps expansion has increased the number of workers in aviation factories from 40,000 to 100,000. This means that, under war conditions, the workers in aviation factories will be increased at least six times.

Organized labor properly has watched these steps closely. The suggested creation of a vast pool of skilled labor as a reserve for military purposes, and for civil

purposes under War conditions, inevitably has raised the hackles of Labor. It is realized, of course, the availability of a great supply of learners and apprentices will sharply depress the commercial value of skilled labor. Labor believes it is unnecessary to train great numbers prior to the need; that specialized workers may be trained in a few days; and that the great military pool of skilled workers is unnecessary.

### Placating Labor

Government, which also means the President, finds itself in an exceedingly embarrassing situation. This program of mobilization of skilled labor for the various uses of defense, so long as there is no War, embarrassingly collides with unemployment and with the protective laws for labor administered by the National Labor Relations Board, the Wage-Hours Administration, and other agencies provided to maintain unions, wage standards, hours schedules, and labor practices.

The extremely delicate problem of providing the reserve for defense, and of placating labor, was handed to an organization called an Interdepartmental Committee on Mechanics Training, headed by Civil Aeronautics Administration Member Oswald Ryan. This Interdepartmental Committee recently reported to the President. Its first study was devoted to aviation labor problems. But the principles it laid down may reasonably be regarded as the basis for all military labor problems. It recommended: "The existing facilities for the training of skilled workers should be expanded to the limit of peacetime practicability" and that workers

be provided by "breaking down skilled jobs into semi-skilled operations, which can be performed by available semi-skilled workers or by beginners who can be trained in a relatively short time."

### Contemplated Program

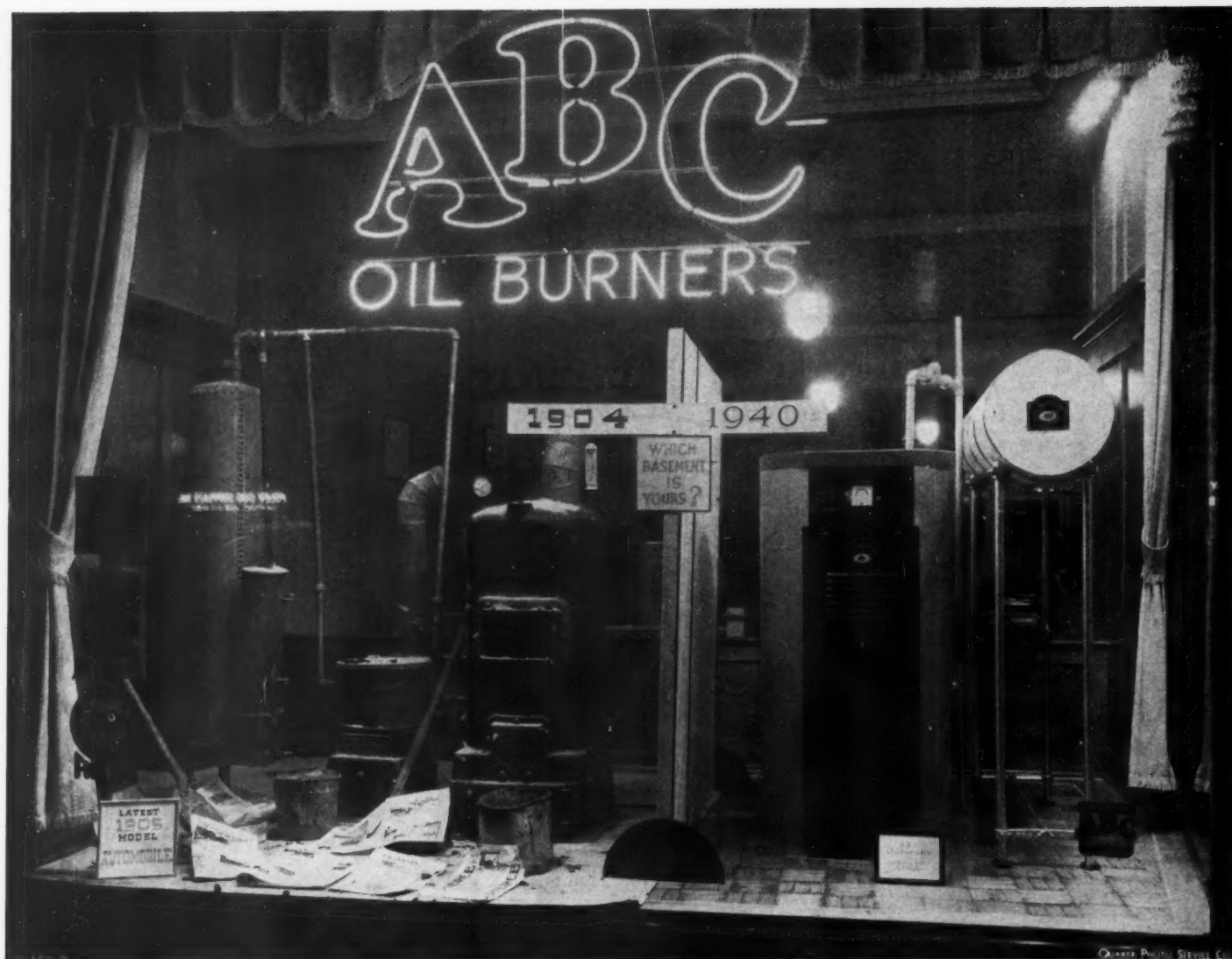
The Committee recommends that apprenticeship systems be immediately established, "through the creation of local joint trade apprenticeship committees. These committees should determine the proportion of apprentices to employed skilled mechanics, giving full consideration to probable needs in time of war." It also urges wider application of the Federal Committee on Apprenticeship standards; and it recommends that Public Vocational and Trade Schools assist industry in job training of employed workers and apprentices by Foreman Conferences, Teacher Training Courses, Apprentice Instruction, and evening trade extension classes for employed workers.

It recommends that state and local public technical schools be expanded to meet the need for junior technicians, and that vocational schools cooperate with the National Youth Administration. The National Youth Administration, which operates several training centers, and which devotes particular attention to training youngsters to become sheet metal workers, is urged to place its young men in employment as apprentices or as learners. The CCC in its 1,500 camps is expected to focus on vocational training, and to secure jobs, or further training, for its enrollees.

It is assumed here the President has issued orders to the various agencies to carry out the program. War and navy departments and other agencies apparently are expected to produce skilled mechanics capable of all 'round work, and particularly capable of teaching others. It appears to be the basic plan to make a highly proficient group of skilled workers who may be able to train others in semi-skilled jobs, and also may be able to train more instructors. The Office of Education, which will supervise the expenditure of approximately

*(Continued on page 78)*





## Is Your Heating System 1905 Model?

THE ABC Oil Burner and Engineering Co., Philadelphia, merchandisers of warm air heating, hot water heating, furnaces, boilers, oil burners, air conditioning apparatus and occupying a choice location in the nearin downtown business district try to get the most advertising value from their wide show windows. To this end, seasonal and timely displays of equipment are staged, first to attract the attention of passersby and, secondly, as an adjunct to showroom demonstrations.

This spring, and last spring, the display shown in the photograph has been used with excellent results. The equipment might have been warm air apparatus rather than hot water; but either type emphasizes the theme of the display—The heating system should be as up-to-date as the automobile you drive.

In explanation of the display and the uses to which it is put, Mitchel Landau, Manager, Heating and Air Conditioning Departments, says—"The conception of this display goes back two years. In 1937 we wanted a good window display of hot water heating accessories, particularly equipment to provide domestic hot water and circulated hot water

for heating. We filled up the windows with beautiful pictures and displayed such equipment as pumps, valves, indirect water heaters and all the rest of the equipment which goes to make up a modern system.

"We found that while this display created some interest, that's as far as it went because people were not interested in pumps, valves, and so forth.

"In 1938, we again wanted a display demonstrating summer and winter domestic hot water, but did not want to show a pump and valves. The problem was to sell the passerby on what he would actually receive. At that time we fixed up a window showing the new and old basement, similar to the photograph, and the reaction was very favorable.

"This year, we again set up this same demonstration, but tacked on the date line, 1904 and 1940, and also tied in the old-style automobile with the old-fashioned basement. A cardboard sign, which you cannot read on the photograph, says: 'You would not drive a 1905 automobile. Why use a 1905 heating plant?' The rest of the window follows this idea.

*(Continued on page 88)*

# Pennsylvania Association Optimistic

OPTIMISM and real achievement were the keynotes sounded at the annual convention of the Sheet Metal and Roofing Contractors Association of Pennsylvania, held June 15th and 16th at the General Broadhead Hotel, Beaver Falls. With President A. J. Sabathné in the Chair, General Chairman W. J. Crowther of the Convention Committee introduced Hon. John S. Tress, mayor of Beaver Falls, who welcomed the delegates and guests. Freedom of the city was given to all in attendance at the convention by means of a card, signed by His Honor.

Pres. Sabathné appointed W. J. Crowther, Chairman, Claire Funkhouser and W. J. Harper, all of the Beaver County Association, to the Credentials Committee. J. E. Harper, Chairman, Geo. Zellar, of the Beaver County Association, and J. D. Sprucebank of Jeannette to the Auditing Committee. The Resolutions Committee was made up of Louis Luckhardt, Chairman, and Ed. Reismeyer of Pittsburgh and Harry Hartline of Erie.

## Auxiliary

H. S. Criswell, of McClure-Johnson Co. of Pittsburgh and Secretary-Treasurer of the Auxiliary, stressed the need for *selling* on the part of the whole industry, but particularly by the *sheet metal contractor*, who was the front line man as far as the consumer was concerned. He emphasized that goods and services had to be sold and that the contractors should keep their eyes and ears open to be able to *Sell* and *Sell* and then *Sell* some more. Mr. Criswell stressed the need for regulations to protect the channels of sale of all goods consumed by the sheet metal contractor and warned that eternal vigilance was necessary to keep the mail order chains and hardware dealers from selling direct to farmers, barbers, etc. Mr. Criswell also stressed the fact that the Auxiliary had proved itself as a real membership stimulus, and pointed with pride to the secretary's record of new memberships obtained for the state association by the Auxiliary members.

## Membership

Louis Luckhardt of Pittsburgh, replying to Mr. Criswell, explained that all membership must flow through local associations where established, because the real strength of any state association comes from the strength of the local association. State Secretary M. F. Lieberman also made the same point with emphasis on the real need for the organization of strong local associations if the state association was to prosper and do the work which some non-members in some parts of the state insisted should be done.

Pres. A. J. Sabathné of Altoona in his report told the convention of the accomplishments of the state association in the year preceding the convention. He pointed out that due to the efforts of the locals and the Auxiliary the state membership had increased by 59 per cent. He also expressed the belief that membership in the state association could be obtained by a real

membership committee and asked for such a committee. President Sabathné also told of the accomplishment of the state association in really achieving the enactment of a bill by the State Legislature which causes a substantial reduction in workmen's compensation rates. This reduction will amount to between 40 and 60 per cent and was the result of concerted effort on the part of the state association without any help from some parts of the state, whose interests were served by the state association.

## Codes and Licensing

Warren Carter, President Carter-Dunlevy Co. of Philadelphia, told the convention that the real solution to most of the problems encountered by the sheet metal contractor was the enactment of a codes and licensing bill by the local political sub-divisions, for the real protection of the consumer from the shyster. He insisted that our industry was as important as plumbing and yet the plumbers had lobbied all sorts of codes for themselves from local councils, etc. Mr. Carter insisted that a Codes and Licensing Act would assure the consumer of honest materials, honestly installed, and would serve as a real check on the barbers and shoemakers who were trying to chisel in on the warm-air sheet metal contractors' real field. He made the flat statement that the sheet metal and warm air industry was asleep, because of the substitution of materials for sheet metal, which were being installed by the handy man without any supervision whatever.

E. M. Reismeyer of Pittsburgh, commenting on the excellence of Mr. Carter's ideas, made the point that it was up to the real warm-air sheet metal contractors to stop the substitutions and cheap trickery of competition. He said that the level of the industry would only be raised by a real co-operative campaign of education on the part of the entire industry—mills, manufacturers, jobbers and contractors. State Secretary M. F. Liebermann of Ambridge then read his report.

## The Year's Progress

M. F. Liebermann, Secretary, reported a surprising amount of activity during the year and progress made in the face of adverse business conditions. Much credit, he said, should be credited to the Salesmen's Auxiliary for increasing the membership—they having procured 22 new members.

The Pittsburgh local increased their membership by seven. President Sabathné and Vice-President S. H. Meyer each contributed to the increase in membership.

"To Seek Relief from the Excessive Compensation Insurance Rates which We Are Compelled to Pay" was the outstanding subject under discussion at the last meeting, and was referred to the Resolutions Committee. They in turn felt the subject of such great importance that they recommended that it be referred to the Board of Directors, and the Board of Directors, at their session, turned the matter over to the Legislative Committee, when appointed by the president. Some time



after the convention, the president appointed the following to serve as the Legislative Committee of the Pennsylvania association:

W. J. Keist, Pittsburgh, Chairman  
W. W. Collar, New Brighton  
F. M. Braeger, Erie  
C. C. Kottcamp & Son, York  
C. O. McKerihan, Altoona  
Frank Schimpf, Vandergrift  
C. A. Thomas, Lewistown

Mr. Liebermann told of attending a committee of the Pittsburgh Local on January 14, at which meeting a set of resolutions was drawn up and a copy sent to all members, and a copy of the Resolution and a letter sent to the Governor, Secretary of Labor and Industry, and each Senator and Member of the House of Representatives at Harrisburg, asking their support to give relief in the matter of Compensation Insurance Rates. A subsequent meeting of the Pittsburgh local was held at which were present two members of the Legislature, a Congressman and Mr. Liebermann. At this meeting, it was thought expedient to send a committee to Harrisburg for conference with the Hon. Mr. Wilson, Chairman of the Compensation Law Committee, and as many Senators and Members of the House as it was possible to meet. On March 21, a committee consisting of President Sabathné, W. C. Markle and Secretary Liebermann went to Harrisburg. Since this visit the Compensation Law has been passed that will give a reduction of approximately 50 per cent from present rates. Mr. Liebermann believes that the labor, efforts and visit to Harrisburg contributed in great measure to securing this benefit. The sad part, he said, was that the members of the State association stood the blunt of the whole thing and the entire craft through the whole State received the benefit. Mr. Liebermann mentioned the apathy of the major number of men in the field that adopted the spirit of "Let George Do It," but said that notwithstanding these discouraging things the association had made real headway throughout the past year.

#### Financial

State Treasurer Harry G. Hartline of Erie then read his report, which showed the fiscal condition of the association and which led him to remark that membership was the only thing which would help the association and relieve the financial burden on the few, who in reality were obtaining benefits for the many.

#### Apprenticeship

E. H. Reismeyer, Pittsburgh Chairman of the Vocational Training Committee, asked the convention and the industry to give real thought to the problem of apprenticeship training. Some schools give vocational training, but the members do not insist that local school boards give vocational training in the sheet metal working craft. Checks should be made by responsible contractors to see that proper instruction is given in sheet metal craftsmanship. Mr. Reismeyer insisted that the great majority of so-called bad jobs were being installed by mechanics who had been improperly trained in the craft. Mr. Reismeyer also said that sons of

sheet metal contractors should be the first line of defense for Grade "A" craftsmanship.

Secretary-Treasurer Criswell of the Auxiliary, commenting on the remarks of Chairman Reismeyer, told of the situation at Pennsylvania State Teachers College at California, Pa., where only one semester was devoted to each trade, which indicated the need for the full co-operation of the entire industry in furthering real apprenticeship training. Louis Luckhardt of Pittsburgh, commenting on the same report, outlined the help given in the training of apprentices by the Federal government.

Due to the unavoidable absence of Chairman H. E. Kottcamp of York the report of the Trade Relation and Policy Committee was not given.

#### Legislation

Chairman W. J. Keist, Pittsburgh, of the Legislative Committee reported the results of the committee for the year 1938-1939.

The committee feels that it will be necessary to have some legislation passed for health and safety, establishing some rules and regulations for installing warm air gravity and mechanical heating systems, compelling all contractors and installers to abide by the Standard Practice of Sheet Metal, compiled and adopted by the National Association of Sheet Metal Contractors for the fabricating and installing of sheet metal, together with the Standard Code compiled and adopted by the National Warm Air Heating and Air Conditioning Association, and the Guide by the A. S. H. & V. E., copies of which are available for the engineering, making of plans and the installing of heating units.

The committee deems it advisable to have compiled some sort of a code "for the health and safety of our customers and the public at large," together with the establishment of some system for examination and licensing by a commission of six competent engineers and mechanics selected by the state association from different sections of the state, together with one representative appointed by the Governor, making a board of seven members, and inspectors appointed by this board to handle the issuing of permits followed by the proper inspection of jobs.

The committee believes that the industry should insist that the manufacturers of warm air heating equipment and sheet metal products should deny the right to the purchase of their products by any individual, firm or corporation not qualified with mechanical and technical ability to properly install these products.

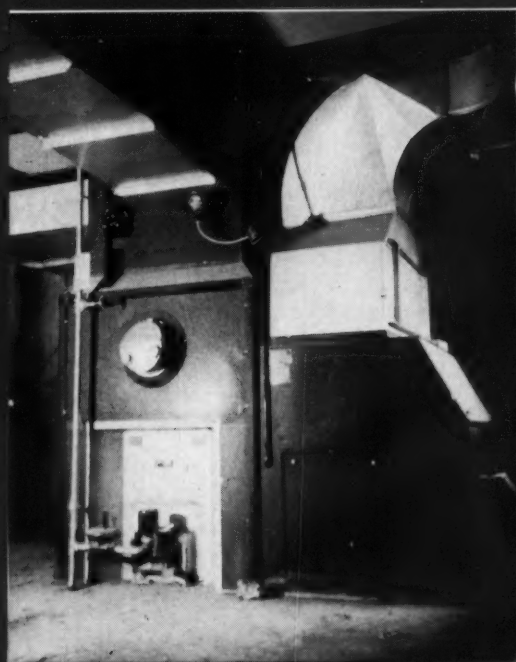
The committee believes that the industry should protect against the payment of relief or government work relief to any alien, and that these should be deported at once. Also, that the industry should petition both state and national government to reduce expenses and return to sound operation of government on a conservative business basis, lightening the tax burden, and not stifling the will to create business to make money and then pay it out in taxes. They would also like to see every able bodied person be compelled to create at least as much as he consumes; they believe that we

*(Continued on page 80)*

AMERICAN ARTISAN

# RESIDENTIAL AIR CONDITIONING

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DEVOTED TO HOME AND SMALL COMMERCIAL AIR CONDITIONING



# FILTERS *Aren't* MADE TO WALK ON *But*

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The Symbol of Clean Air

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# Air Conditioning Facts From the Research Residence

## Mechanical Condensing Type of Cooling Unit

By S. Konzo

Special Research Assistant Professor  
Engineering Experiment Station  
University of Illinois

A COMPLETE refrigerating system includes:

- a refrigerant gas which conveys the heat absorbed from the air circulated in the air conditioning system to the water or air used for cooling the refrigerant.
- an evaporator or heat absorbing unit in which the heat transfer from the circulating air to the refrigerant takes place,
- a condensing unit which draws the refrigerant gas from the evaporator (cooling coil), compresses it to a higher temperature and pressure, and then cools and condenses the refrigerant to a liquid, and
- water or air used for cooling the high temperature refrigerant before it is stored in a receiver, from which the refrigerant is circulated through the cooling coil.

The essential processes are shown in Fig. 1, from which it may be observed that three separate and

distinct heat transfer mediums are involved, consisting of:

- Cooled air, which upon being introduced into the room to be cooled, is warmed and returned to the cooling coil. The warm air passing over the outside surfaces of the cooling coil (Fig. 2) is cooled and dried to some extent.
- Cooled refrigerant flowing through the inside of the tubes in the cooling coil absorbs the heat in the air. (As shown in transfer A in Fig. 1). The heated refrigerant is in turn cooled, as indicated by transfer B in Fig. 1, by means of the third medium.
- The final cooling medium is usually either water or air. Hence, the whole process may be conceived as one in which the heat absorbed from the circulating air is finally "dumped" into the cooling water which goes to waste. In this respect therefore, a mechanical condensing unit introduces one extra step as compared with those necessary in the ordinary water cooling coil.

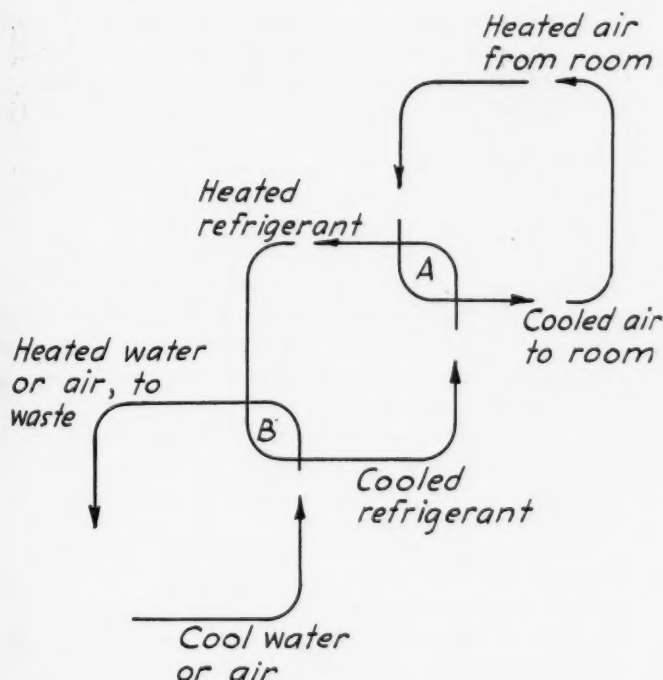


Fig. 1—Diagrammatic sequence of the heat flow process. Where transfer of heat from air to coil and from refrigerant to air or water is shown where lines cross (A, B, C).

### Rating of Condensing Units

The selection of a condensing unit for any given cooling system should be determined from catalogues supplied by the manufacturer of condensing units. The rating of these units, expressed in Btu

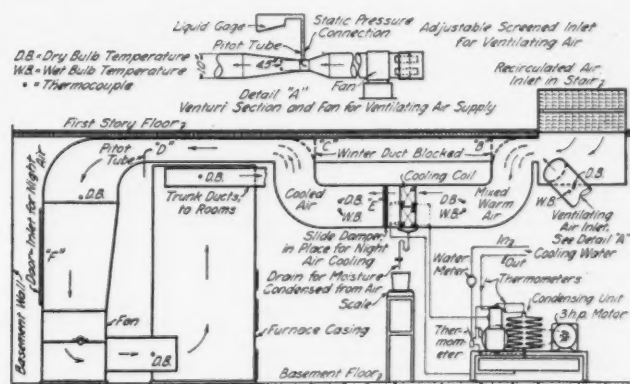


Fig. 2—Diagram of cooling plant in Research Residence during tests with mechanical refrigeration. (From Univ. of Illinois Eng. Exp. Station Bulletin 290).



per hr., is dependent on several factors, the value of which should be supplied to the manufacturer. For example, one catalogue shows that the same machine has the following ratings.

Rating = 9,800 Btu per hr. for  
20 deg. F. evaporator (or coil) temperature  
90 deg. F. cooling water  
100 deg. F. ambient (surrounding) air temperature  
and,  
Rating = 18,900 Btu per hr. for  
44 deg. F. evaporator temperature  
70 deg. F. cooling water  
100 deg. F. ambient air temperature.

"Hence in stating the capacity rating of a condensing unit, the figures are worthless unless the operating conditions also are stated."

The complete information required by a manufacturer of condensing units consists of:

- 1) Maximum capacity required in Btu per hr.,
- 2) Proportion of maximum capacity required to condense moisture,
- 3) Temperature of cooling water available, or temperature of air used to cool the condensing unit,
- 4) Temperature of air surrounding the condensing unit.
- 5) Voltage and phase of electric supply.

From this information the manufacturer can supply the following information.

- 1) Type and size of evaporators or cooling coils, including volume of circulating air required,
- 2) Type and size of condensing unit,
- 3) Speed of condensing unit and size of motor required.

In general, therefore, the manufacturer should be able to supply a unit, which will have sufficient capacity as determined from ratings made in accordance with Standards adopted by the American Society of Refrigerating Engineers. The installation and adjustment of condensing units should be placed in the hands of competent and experienced installers. To do otherwise is to invite grief.

#### Temperature Schedules to Be Maintained

The following discussion reproduced from University of Illinois Engineering Experiment Station Bulletin 290 bears upon "one of the most debatable questions involved in space cooling; namely, the one concerning the proper indoor temperature to be maintained, together with its relationship to the outdoor temperature. Sufficient data were obtained

TABLE 1\*  
DESIRABLE INDOOR AIR CONDITIONS IN SUMMER CORRESPONDING TO OUTDOOR TEMPERATURES  
Applicable to exposures of less than 3 hours

Indoor Air Conditions with Dew-Point Constant at 57 deg. F.			
Outdoor Temperature deg. F.			
Dry-Bulb	Dry-Bulb deg. F.	Wet-Bulb deg. F.	Effective Temperature deg. F.
95	80.0	65.0	73
90	78.0	64.5	72
85	76.5	64.0	71
80	75.0	63.5	70
75	73.5	63.0	69
70	72.0	62.5	68

\*Reproduced from the American Society of Heating and Ventilating Engineers Guide for 1934, Table 2, page 33.

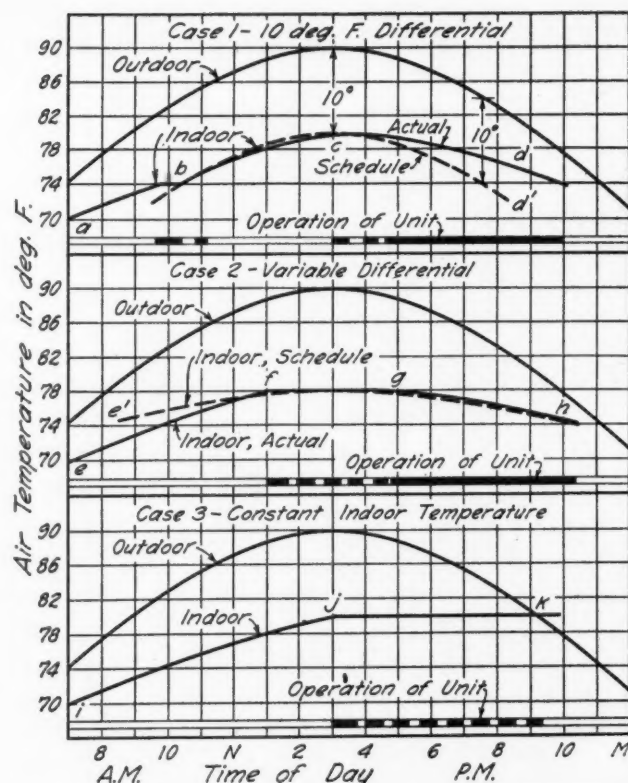


Fig. 3—Operating cycles of cooling unit and air temperatures obtained in maintaining three schedules of room air temperatures under operation as shown at top of each chart. (From Univ. of Illinois Eng. Exp. Station Bulletin 290).

from preliminary tests on a room cooling unit to permit the construction of the diagrams shown in Fig. 3. These diagrams represent idealized schedules of outdoor and indoor temperatures and the approximate length of operating periods required by the cooling unit to maintain the indoor temperatures shown.

Figure 3 shows three possible schedules of indoor temperatures, or methods of operating a room cooling unit. The schedule for the first method, designated as Case 1, is based on the assumption that the indoor temperature should at all times be maintained at a value 10 deg. F. less than the outdoor temperature. This condition is represented by the broken line, and the approximate indoor air temperature **actually maintained** by the operation of the room cooling unit is shown by the full line in the diagram. It may be noted that with this schedule of operation it was necessary to start the cooling unit a considerable length of time before the maximum outdoor temperature was reached. At the starting time the indoor temperature conditions are indicated by point b, and during the period indicated between the points b and c, the outdoor air temperature increased more rapidly than the indoor air temperature.

It should also be noted that after the outdoor air temperature had reached a peak value and started to decline, it was necessary to progressively reduce the indoor air temperature in order to attempt to maintain the constant differential as specified by the schedule. This reduction in indoor air temperature, accompanied by a reduction in the temperature of the contents of the room, such as

furniture, inside partition walls, etc., in the later evening hours when the cooling load was just reaching a peak due to the lag in heat transmission through the outside walls, imposed such an exceedingly heavy load on the unit as to make it impossible to maintain the required indoor temperature, and thus to make this schedule of operation impractical. A cooling plant of sufficient size to maintain this schedule in the late afternoon or evening would be prohibitive in first cost and uneconomical to operate. Furthermore, if the indoor conditions were conducive to comfort during the peak outdoor temperature, there was no indication or reason to believe that the maintenance of these conditions resulted in discomfort after the peak had passed.

"With the second method of operation, designated as Case 2 in Fig. 3, an attempt was made to maintain the schedule of desirable indoor air temperatures given in Table 1. This schedule provides for a variable differential between the indoor and outdoor temperatures, the differential increasing or decreasing progressively as the outdoor temperature increases or decreases. The difficulties encountered with this method of operation were similar to those discussed under Case 1, but somewhat less pronounced, because the differences between indoor and outdoor temperatures were not as great for this case as those required for Case 1. In addition, both methods required careful manual control and adjustment, which would be entirely impractical and unsatisfactory in a domestic installation.

"With the third and more simple method of operation, which was finally adopted as a standard and is designated as Case 3 in Fig. 3, the cooling unit was started when the effective temperature reached some predetermined value as, for example,

75 deg. F., irrespective of the outdoor temperature. This usually occurred when the indoor dry-bulb temperature reached a value between 78 and 81 deg. F., depending upon the relative humidity although in some of the tests slightly lower dry-bulb temperatures were maintained. The indoor dry-bulb temperature was maintained practically constant by operating the unit intermittently through the action of a simple two-point thermostat placed in the electric fan circuit. This method of operation was very satisfactory, and the indoor temperature conditions were maintained by operating the unit until the outdoor effective temperature dropped to approximately the same value as the indoor effective temperature, at which time the unit was stopped and the windows were opened.

"The choice of a particular dry-bulb temperature to be maintained on a given day for any domestic air cooling unit installation is governed by a number of factors, including that of economy of operation. Obviously, for economical reasons, it is advisable to maintain the highest indoor air temperature conducive to comfort. For climatic conditions similar to those of Urbana, Illinois, experience has shown that an indoor dry-bulb temperature of approximately 77 to 80 deg. F., with relative humidities between 40 and 60 per cent is very satisfactory, whereas for cooler climates it is probable that a slightly lower air temperature might be necessary. Regardless of the particular indoor air temperature to be maintained, there seems to be little need for complex schedules of operation such as those illustrated by Cases 1 and 2."

### Typical Operating Results

A graphical log showing typical operating results from the operation of a 30,000 Btu per hr. condensing unit in the Research Residence is shown in Fig. 4. On this day in which the outdoor temperature reached a maximum of 99.0 deg. F. at 3:45 P. M. the indoor effective temperature did not exceed 74 deg., which is slightly below the upper border line for comfort, as established by the A.S.H.V.E. Laboratories. The indoor relative humidity was reduced from 60 per cent to approximately 45 per cent, and the indoor dry-bulb temperature did not exceed 81 deg. F. at any time. The cooling unit operated intermittently from 6:30 A. M. to 11:20 A. M. and continuously from 11:20 A. M. until 11:15 P. M.

From the results of the tests conducted in the Research Residence the following conclusions may be drawn, subject to the limitations of the conditions under which the tests were run:

- 1) The ducts and registers of a central forced-air heating system can be successfully adapted as a distributing system for cooling air in the summertime without material alterations.
- 2) No moisture condensation was observed on the surface of the ducts carrying cooled air beyond three feet from the cooling coil. Ducts passing through heated spaces such as attics,

(Continued on page 72)

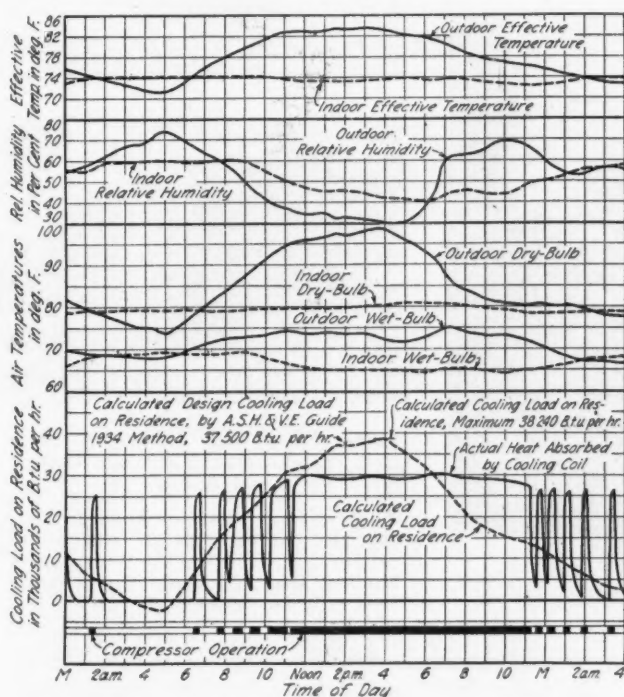


Fig. 4—Graphical log of air temperatures, relative humidities and cooling load. (From Univ. of Illinois Eng. Exp. Station Bulletin 290).



# "Attic Fans" Need Not Be Limited to Attics

The idea that "attic fans" can only be installed in attics, narrows the field of application. The author of this article has built a profitable market by selling "attic fans" to commercial, above-roof users.

By Lawrence E. Gichner  
Gichner, Inc., Washington, D. C.

**A**N APPRECIATED job makes one feel good. A satisfied customer means satisfaction all around. The answer to these statements, both from the emotional and profitable angle, may be found in attic fans.

The possibilities in attic fans in the ventilating field are practically endless. "Attic fans" are a misnomer, for their use is applicable in a much wider range, from basement to roof. Their modest price makes them saleable where ventilating could not be sold before. They are a blessing to the store and restaurant which cannot afford air conditioning and in many instances are almost as satisfactory.

Our first big thrill in selling an attic fan came with our first installation. The customer was an elderly couple who had saved up money for their two weeks vacation. They reasoned that possibly with an attic fan they would have many months of comfort, where a vacation lasts only a short time. The letter which they wrote was not only a great satisfaction, but an inspiration to sell many more

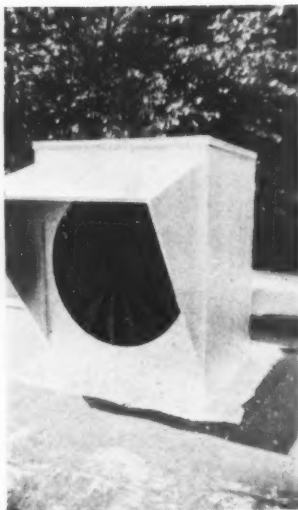
jobs. The contents of the letter was this:

"This is just a line to tell you that we believe that our investment in the large exhaust fan you installed for us the first of last summer is about the best investment we ever made. It is paying large dividends in cool, fresh air. We turn it on in the evening, with no appreciable increase in the electric light bill, and spend delightfully cool nights with the house filled with live air.

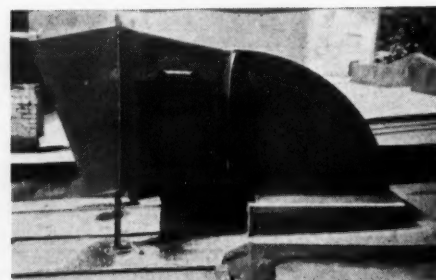
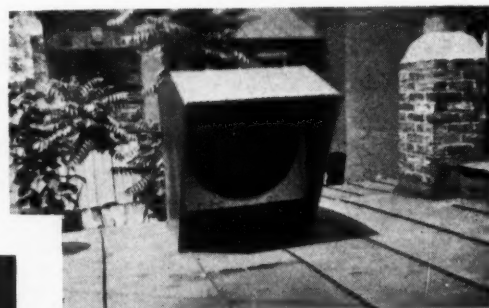
"We recommend this method of air-conditioning one's house at a very small cost.

"Wishing you much success in this very successful method of keeping one comfortable in the summer."

Below—Housed fan on a tin roof showing flange over which a cover is slipped in winter.



Above—Housed fan on top of a 40-foot stack rising from a restaurant range hood.



Left—Housed fan exhausting air from an air-bound pharmacy show window.

Above—Two views of housed fan specially cut through the roof and exhausting air from a restaurant kitchen. Side view shows fan access door.

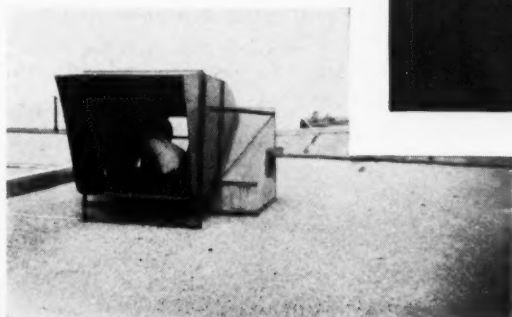
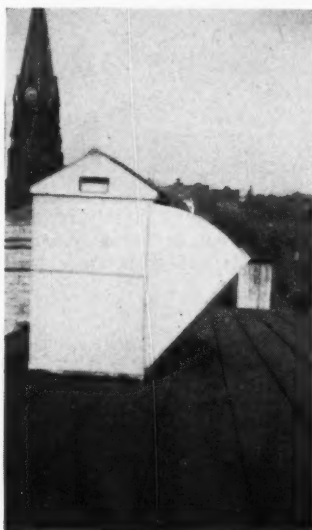
These folks had a skylight in a center hallway. We simply removed the skylight, built a housing in which we mounted a fan over the well, and used the skylight on top for light. A transom sash underneath closes off the opening in winter.

### Housed Fan Advantages

Since that first installation we have developed a number of ideas which improve installation of attic fans under Washington conditions. For example, it has been our experience that outside louvres reduce considerably the efficiency of a fan and we avoid louvres whenever possible. To mount a fan without louvres and still make the installation rain-tight, we have developed a housing structure which appears in most of the photographs. This housing permits us to mount the fan on flat roofs, and to attach the fan to existing skylights which are common to Washington commercial building flat roofs. This idea, we believe, has opened up a wide field

At right—Side view of large housed fan (note skylight above) mounted over the hallway of a 4-story apartment building.

Below—Fan connected to side of a skylight exhausting from a restaurant dining room.



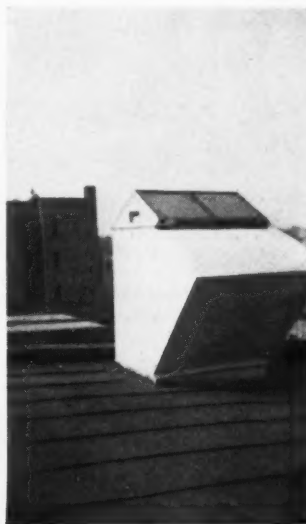
for the sale of attic fans to commercial users. The hood which projects beyond the fan, as shown, is built square with flanges over which a sliding panel can easily be mounted for winter closing.

We have derived a great deal of satisfaction from the sale of attic fans to commercial users. What more satisfaction is there, for the salesman, than enthusiastic endorsement by employees working in a stifling hot laundry or restaurant kitchen where conditions have been made comfortable by the introduction of large volumes of outside air and the exhaust of the heated air which previously made their means of livelihood unbearable?

### Belt Driven Fans

When we began to sell attic fans we were told that belt driven fans had many theoretical disadvantages. We were warned that the installation over a large kitchen range hood would quickly make the belt slip because of grease. We have several fans over such hoods that have been work-

ing for several years. Recent inspection reveals that though the blades are caked with dirt and grease there is no appreciable difference in the volume of air exhausted. The revolving belts seem to clean themselves. We have also heard for years that propeller fans are unsatisfactory when installed in dust systems. Recent installations in which we



Left, above—Side view of same apartment building fan showing skylight and panel mounted for winter season.

Right, above—Housed fan on tall base to clear railing on a large residence. Note large visor.



have made the duct area 25 per cent greater than the fan area, are doing a fine job.

It has been our experience in a great number of instances that the correct place to install a fan is in the center of the roof. Competitors in the oil, coal, specialty and sundry other businesses, who are selling attic fans today, are afraid to cut through the roof for fear of leaks, therefore the sheet metal contractor has the distinct edge, because of his knowledge of knowing how to do proper roofing.

### Commercial Ventilating Possibilities

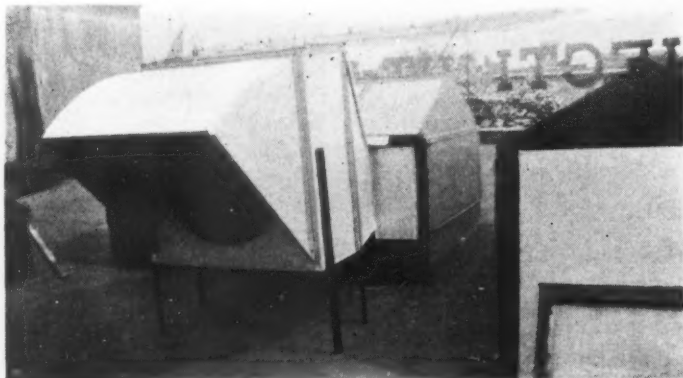
In restaurant kitchens, laundries, and cleaning plants, we have secured best results by placing the fans as close as possible to the source of heat, such as stoves, broilers, ovens, tumblers, ironers, and pressing machines. Wherever possible we have made the installation immediately over the heat-creating unit.

The principle we have found most successful is in having the heat drawn *away* from the operator instead of *over* the operator's body to an exhaust. By having the heat drawn away from the operator we allow the cool inrush of fresh air to course over his body, permitting him to do better, easier, more efficient and less tiring work.



### Fan Location is All-Important

There are in our town hundreds of incorrectly installed exhaust fans. Fans over doorways or next to windows which are short circuited do very little good. Analyzing these problems, we have utilized these fans in more strategic locations and sold the customers a housing and accessories with which



Housed fan on legs connected to side of skylight in a pharmacy. Winter panel stands in foreground. Compare with photograph at right.

they are getting splendid satisfaction.

For years, like hundreds of other sheet metal contractors, we have been installing large stationary hoods for ventilating problems. These ventilators did a fair job, but in many cases left much to be desired.

### Fan Mounted on a Stack

In a newly opened restaurant we experimented with a 24-inch belt driven fan mounted directly over the hood and connected with a 24-inch by 24-inch straight duct. The results were so satisfactory that immediately we saw great possibility for this type of fan and installation. In installing a fan we try to get as far away from windows and doors as possible, so that the insweeping air will carry over the greatest possible area.

### Keeping Out the Rain

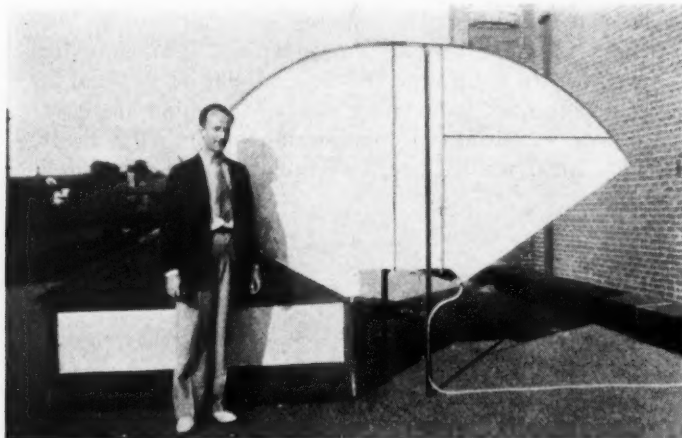
In our particular territory we have tremendous rain storms, but so far not one of our installations

The photograph at the right shows the first, above-roof, housed attic fan unit built by Gichner, Inc. The author calls attention to improvements in design as shown by photographs of later units. Later units can be closed easily for winter with a sliding panel and the general construction is better appearing.

has leaked. Ninety per cent of the fans are facing south, from which direction we found we have the least driving rains.

We have made it a principle to keep the base of the fan opening, in the hoods, approximately 8 inches off the roof to keep the snow out.

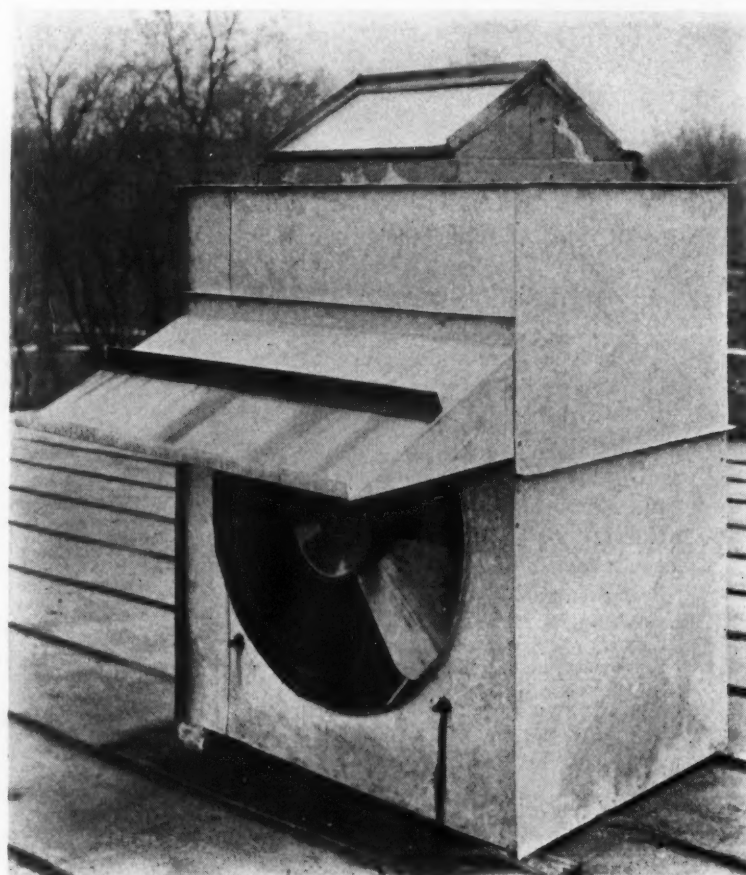
By keeping the fan as far away as possible from



Side view of same pharmacy fan showing connection to skylight and wide visor which keeps out rain and replaces louvers.

doors and windows there is no necessity for the door and windows to be kept shut, which is almost an impossibility in the hot summer, but, instead, the open doors and windows provide a source of supply for the onrush of new air.

Two warnings we consider essential—allow plenty of opening for the fan and use a fan of ample capacity.





Pittsburgh Experiment Station of the U. S. Bureau of Mines where the Research Laboratory of the American Society of Heating and Ventilating Engineers is located

## Frictional Resistance to the Flow of Air in Straight Ducts

By F. C. Houghten\*, J. B. Schmieler\*\*, (MEMBERS),  
J. A. Zalovcik\*\*\*, and N. Ivanovict, Pittsburgh, Pa.

THE increase in the use of air distributing systems in connection with heating, cooling and air conditioning during the past decade has resulted in a more critical interest in the design and cost of duct work. In this connection, there developed a lack of confidence in the available design data for estimating the carrying capacity of a given size of duct for a given pressure loss. In order to correct this condition, the Research Laboratory was asked to make a study of the frictional resistance to the flow of air in ducts and fittings. The work was undertaken at the Laboratory under the Technical Advisory Committee on Air Distribution and Air Friction, whose personnel during 1938 included: J. H. Van Alsbury, *Chairman*, S. H. Downs, M. K. Fahnestock, F. J. Kurth, R. D. Madison, L. G. Miller, D. W. Nelson, C. H. Randolph, Ernest Szekely and G. L. Tuve.

The program originally laid out by the Committee included a study of the frictional resistance to the flow of air in straight runs, elbows, Y's, reducers, and other fittings commonly included in air distributing systems.

\*Director, Research Laboratory, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

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The study of elbows was to include variations in radius of curvature, with and without turning blades. The first set-up was designed to include two elbows with variations in the set-up to include Y's and other connections. Early in the investigation difficulty was experienced in accounting for some of the results obtained both for the straight ducts and more particularly for the elbows, and in order to simplify the procedure attention was limited to the study of the flow of air in straight ducts. The study of straight ducts was outlined to include round ducts, square ducts, and ducts of rectangular cross-section of various aspect ratios. Different essentials in design and workmanship including ducts laid out and built in local shops and ducts fabricated under mass production methods in a factory for wide distribution were to be studied. Here again, the difficulties involving variations in joints due to design and workmanship resulted in a further curtailment of the original program to include only round and square ducts of two designs, referred to as *shop-made* and *factory-made* with the exception of a single rectangular duct,  $15\frac{5}{8}$  by  $3\frac{3}{4}$  in. in cross-section. The future program of the Committee provides for a continued investigation of those phases of the study not completed to date including rectangular ducts, and fittings.

This paper includes the results of the study on the frictional resistance to the flow of air in 4-in., 8-in. and



24-in. round ducts and square ducts of approximately equivalent carrying capacity for the same frictional resistance. Results of the frictional resistance to the flow of air in straight ducts without joints and the added resistance offered by joints are included. The paper also presents the relationship between the friction factor and the Reynolds Number found for the round ducts. A modified form of the Fanning equation is shown to apply with a high degree of accuracy for the three sizes of ducts, justifying its use for expanding friction flow characteristics from the three sizes of ducts studied to smaller, intermediate and larger sizes, which can be used with confidence for ducts up to at least 4 ft in diameter, and probably without any considerable error for a wider range. Friction charts based on this expansion are presented for round duct without joints and for round duct with 40 joints per 100 ft of run, ranging from 3 in. to 100 in. in diameter. Based upon the relation between the friction found for round and for square duct and assuming spacing of joints as found in common practice, a modified form of the conversion equation was developed for determining the diameter of a round duct having the same carrying capacity with the same frictional resistance as a given rectangular duct, and a conversion table based upon this formula is presented.

#### Test Set-up and Procedure

Fig. 1 is a photograph of the 7.2-in. square factory-made duct and Fig. 2 a drawing of the test set-up as used for the 8-in. round, shop-made duct. Excepting for transformation pieces to accommodate the different sizes of duct and a larger fan used in the case of the 24-in. round and 22-in. square ducts, essentially the same arrangement was used in studying the other sizes. Elbow losses were studied in connection with the 4- and 8-in. ducts. Since this phase of the study was postponed, elbows were not included in the set-up for the 24-in. round and equivalent square ducts. The desired air velocity through the test section was supplied by a blower equipped with a throttling damper on the intake side. Just beyond the outlet of the blower a relief damper, consisting of 26 1-in. holes around the duct and equipped with a collar, gave further control of the rate of air delivery. For ease in measuring the desired rate of air flow, a U. S. Bureau of Standards calibrated nozzle was located between two 10-ft sections of 12-in. duct. A test section of 8-in. duct was connected to the 12-in. measuring section through a 2-ft, 5-deg transformation piece, a 4-ft section of 8-in. duct containing a straightener, and a 10-ft section containing a Pitot tube. A straightener also preceded

the measuring section of 12-in. duct.

For all sizes of duct studied approximately 60 ft of straight run was used. Provision was made for observing the wet- and dry-bulb temperature of the air after it passed through the nozzle. A Pitot tube station was located in the 60-ft straight run of 8-in. duct  $7\frac{1}{2}$  diameters beyond the straightener. A number of static stations for measuring pressure were located throughout the length of the test section. While the nozzle referred to previously was always used to observe the rate of air flow, the velocity was also checked by a standard Pitot tube whose design is specified in the 1938 edition of the Standard Test Code for Centrifugal and Axial Fans, adopted by a Joint Fan Test Code Committee of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS and the *National Association of Fan Manufacturers*. Three other Pitot tubes were used. It is of interest to note that, with the precautions taken to insure uniform flow, of the four Pitot tubes used one read about 0.6 per cent lower, another about 0.8 per cent lower, and a Prandtl tube gave identical results as the standard tube. The standard Pitot tube gave air quantities 1.1 per cent larger than the calibrated nozzle.

Static stations were placed at frequent intervals along the test section of the duct. The type of static pressure opening is shown in detail in Fig. 2C, and the arrangement whereby four static pressure openings were connected into one tube is shown in Fig. 2B. The type of air straightener used was of the *egg-crate* design and is shown in Fig. 2A. This arrangement was adopted after some experimentation and a great deal of consultation with other experimenters interested in this type of work.

The static pressure differences between stations along the duct, for the Pitot tubes, and for the nozzle, were obtained by the use of either an inclined manometer gage or a Wahlen gage, the latter being used when the pressure differences were small. Xylene with aniline

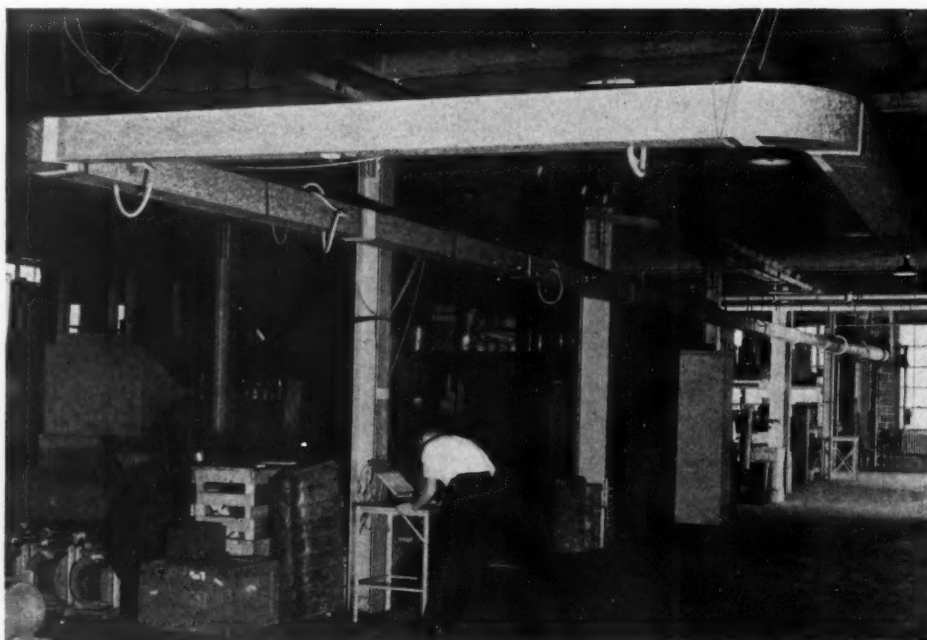


Fig. 1—Test set-up showing 7.2-in. square, factory-made duct. Other duct set-ups were essentially the same

dye added was used in the inclined gage because its density does not vary appreciably with temperature and evaporation. The Wahlen gage<sup>1</sup> used is accurate to 1/1000 of an inch of water pressure.

The formula used to give the air delivery by the nozzle was:

$$V = 4005 C_a C_n \sqrt{h/S} \quad \dots\dots\dots (1)$$

where,

$V$  = actual nozzle velocity in feet per minute  
 $h$  = pressure drop across the nozzle in inches of water  
 $C_a$  = coefficient of discharge = 0.98

$$C_n = \text{nozzle coefficient} = \frac{1}{\sqrt{1 - (d_2/d_1)^4}}$$

where,

$d_2$  = throat diameter of nozzle  
 $d_1$  = line diameter of nozzle  
 $S$  = ratio of test air density to standard air density (dry air at 70 F and 29.92 in. Hg) =  $\frac{17.72 \times BP - 6.70 \times E}{460 + T_t}$

where,

$BP$  = barometric pressure in inches of Hg  
 $E$  = vapor pressure at the dew-point of the mixture  
 $T_t$  = test temperature in degrees Fahrenheit

To obtain the velocity in the duct the following relation was used:

$$V_d = \frac{V_n A_n}{A_d} \quad \dots\dots\dots (2)$$

where,

$V_d$  = duct velocity  
 $V_n$  = nozzle velocity  
 $A_n$  = nozzle throat area  
 $A_d$  = duct area.

The Pitot tube readings were converted into velocities by using the formula:

$$V = 4005 \sqrt{h/S} \quad \dots\dots\dots (3)$$

where,

$h$  = velocity head in inches of water  
 $S$  = (same as in formula (1) for air delivery by the nozzle).

<sup>1</sup>See Bibliography (1).

In making a traverse the positions at which observations were made were such as to give an average velocity when the arithmetical average of the several velocities was taken. The positions were determined by dividing the duct area into several equal concentric areas. The position taken in each concentric area was such that a circle drawn through it would divide this area into two equal concentric areas. For any circle thus drawn there would be two observation points along any diameter, one on either side of the center of the duct. It can be seen that the arithmetical average of the velocities at these points approximates the average velocity in the duct. This approximation improves as the number of points is increased. A mathematical equation can be used giving the distance along the radius where readings are to be taken for a duct divided into any number of equal concentric areas. This equation is:

$$r = \frac{D}{2} \sqrt{\frac{2X-1}{2N}} \quad \dots\dots\dots (4)$$

where,

$r$  = distance along a radius from the center of the duct to the point at which the reading is to be taken  
 $D$  = diameter of duct  
 $X$  = number of the concentric area where the central area is 1  
 $N$  = number of equal concentric areas into which the duct area is to be divided.

Average duct velocities were also obtained by plotting the velocities at these points, integrating the area with a planimeter and calculating average velocities. This method was found to give slightly better results and was used for actual calculations.

Before making a test on any given duct the intake and relief dampers were arranged to give the desired rate of flow, after which the system was continued in operation long enough to establish equilibrium of temperature and flow before making observations. The temperature (dry-bulb and wet-bulb) of the air, rate of air flow, barometric pressure and pressure drops along the duct were then taken by one observer while an assistant watched the nozzle differential gage in order to insure

(Continued on page 88)

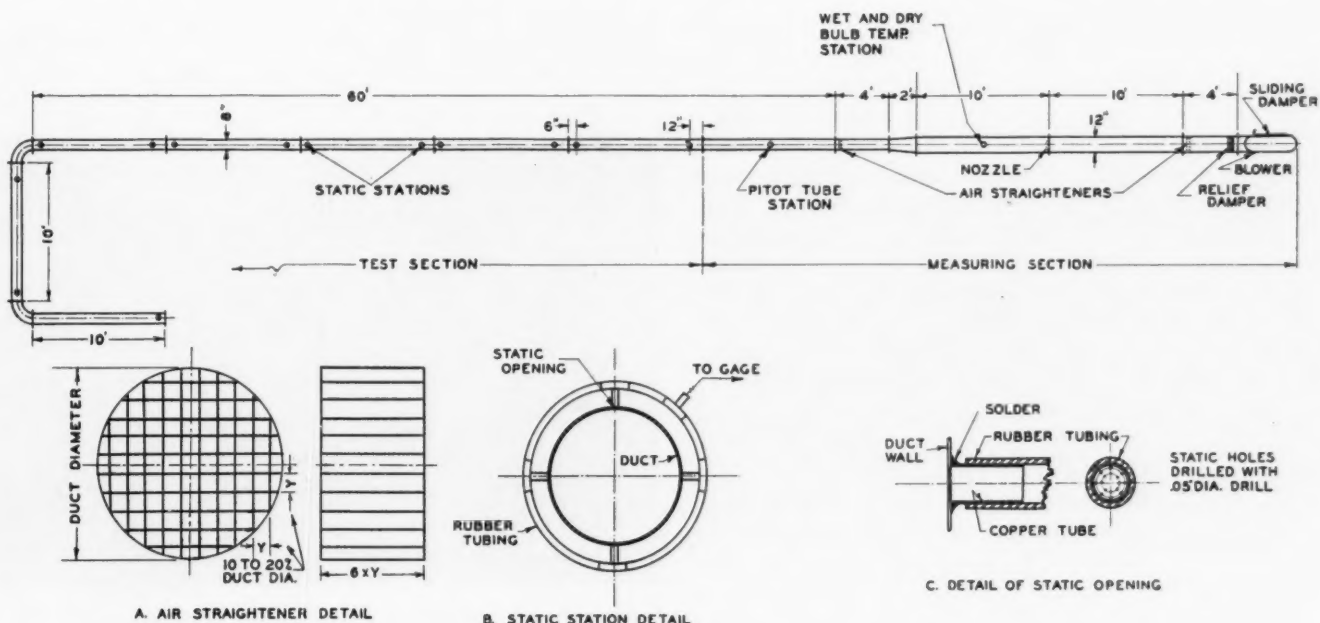
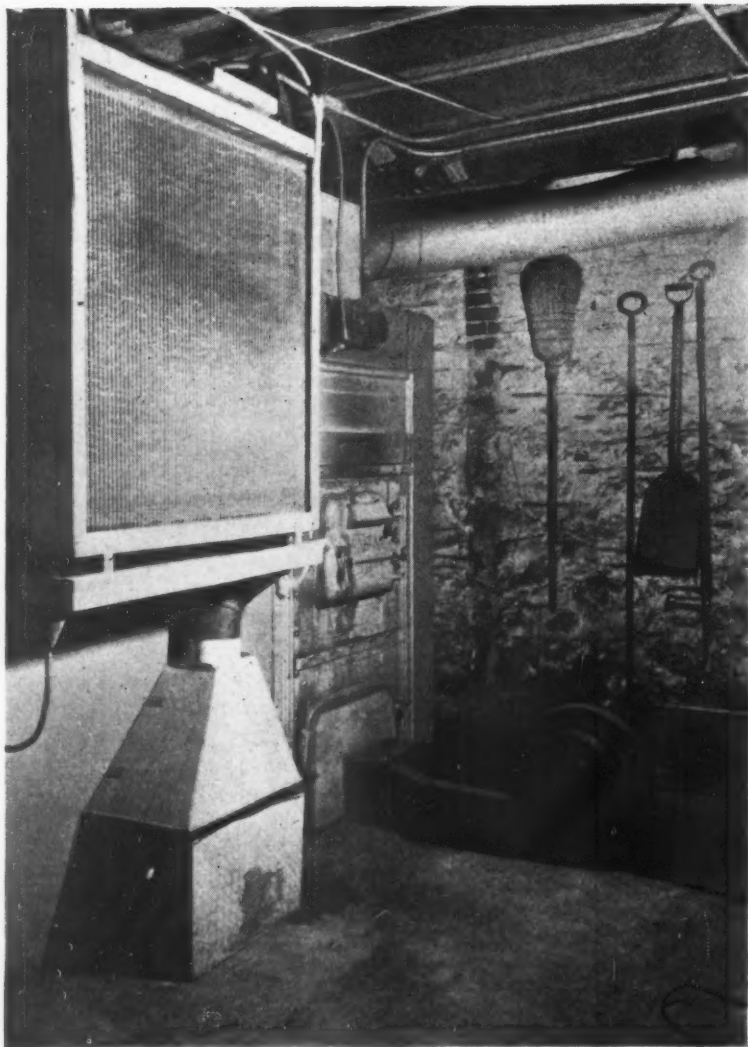


Fig. 2—Test set-up showing 8-in. round duct. Other duct set-ups were essentially the same





**I**N Belvidere, Illinois, the heating and sheet metal firm of S. F. Baker & Sons, late last summer completed an unusual combination cooling and winter air conditioning system in the residence of Mr. Paul Parsons, a local industrialist. The house is cooled by water obtained from a well under the house; heating is by a bin-type stoker in a fan-furnace unit.

#### Cold Water "Discovered"

The cooling system has an interesting story. When Mr. Parsons started to remodel his house, he decided to include cooling as well as winter air conditioning and asked the Baker firm to submit a design for a cooling plant using water from the city supply. During the time the plans were being prepared workmen excavating for the garage floor and foundation discovered an abandoned well, a brick-cased shaft three feet in diameter and 70 feet deep with water standing within shallow well pumping distance of the top. Temperature readings showed the water temperature to be 47 degrees. Subsequent pumping tests with the pump running continuously all day failed to lower the water level below the shallow well pump's "pull."

Mr. Parsons also included another requirement, namely, that the cooling coil should stand exposed in the basement. The result of the discovery of the well and the free standing coil requirement was the system shown in the photograph. The coil was especially built for the installation, 34 inches wide, 36 inches high and

## Year Round Air Conditioning Using Water From A Private Well And Stoker Firing

four rows deep with the coil rows staggered. This coil was cased in galvanized iron by Baker with a condensation pan as shown.

The shallow well pump serves only the cooling coil, city water being used for domestic purposes. The pump is set to maintain about 10 pounds pressure which is sufficient to fill a  $\frac{3}{8}$ -in. copper waste pipe. Under this pressure water enters the coil at 48 degrees and leaves at 69 degrees. All the water is wasted in ordinary operation, but a valve and by-pass in the waste line makes it possible to run the used water back behind the brick casing if conditions ever indicate that the well water level is falling beyond the pump's "pull."

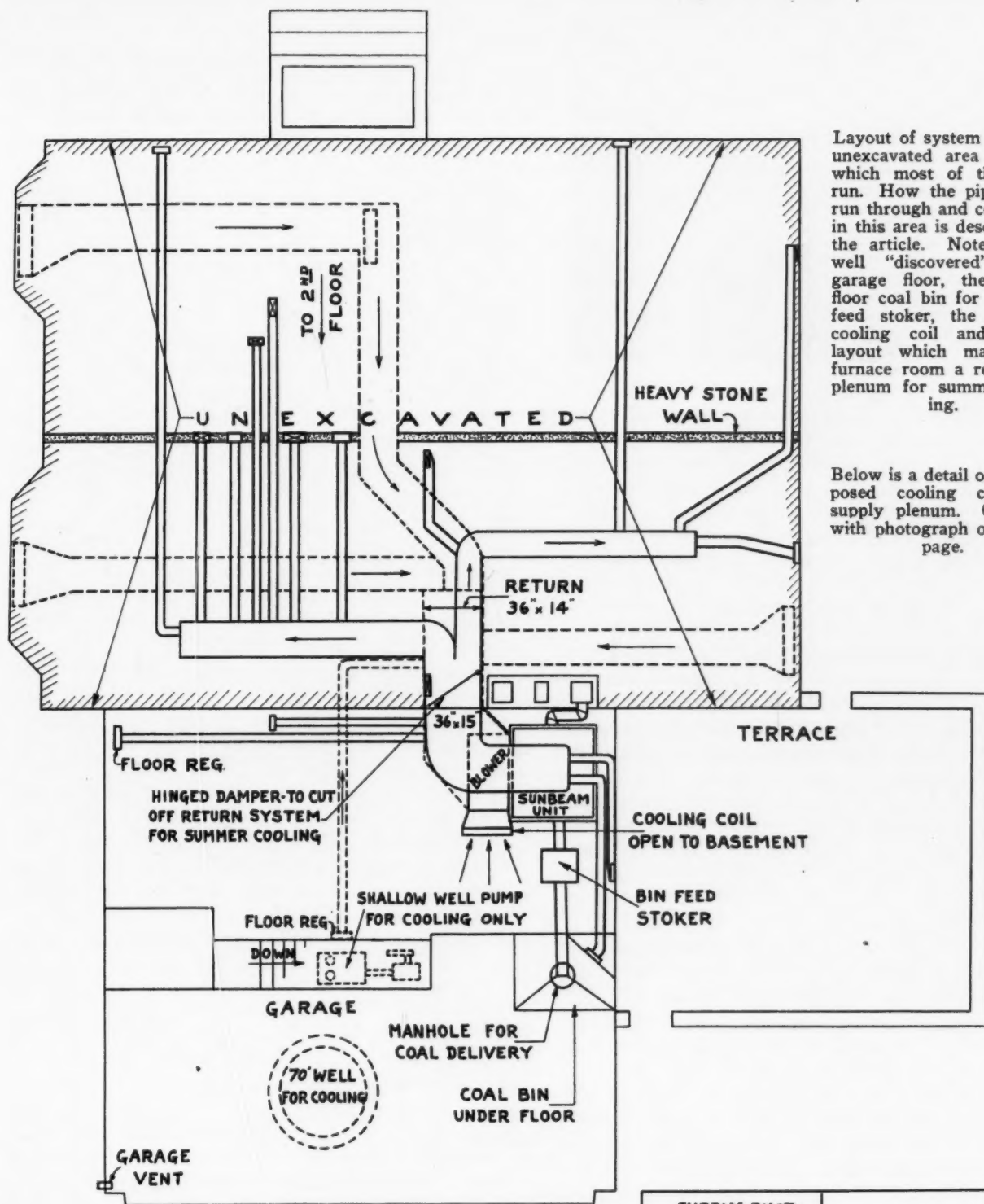
#### Operation of Cooling System

The cooling operation can be seen on the plans. In the return line, just ahead of the blower, there is a swing damper door. In summer this damper is swung across the duct to by-pass the return air into the basement room, from which the air is drawn through the coil into the blower. The air passes through the coil, then the blower, then the furnace casing and up into all the rooms of the house. Any one room is shut off by closing the register valve.

By "dumping" the return air into the basement, a constant circulation of air is established in the base-

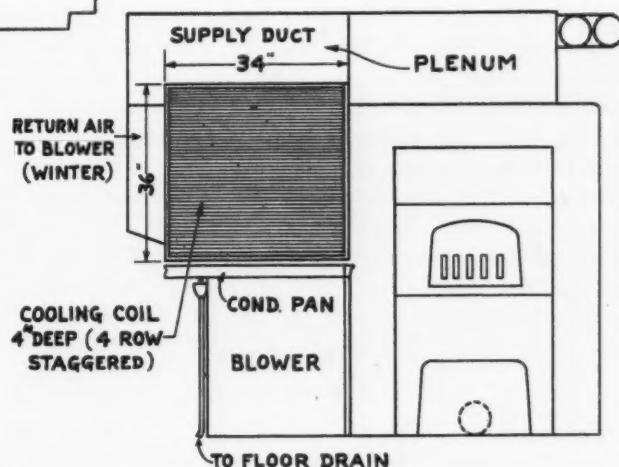


Exterior of residence and, above, view of the exposed cooling coil, furnace and stoker. The box in the foreground is a clinker can with an individual pipe to the chimney.



Layout of system showing unexcavated area through which most of the pipes run. How the pipes were run through and connected in this area is described in the article. Note private well "discovered" under garage floor, the under-floor coal bin for the bin-feed stoker, the exposed cooling coil and piping layout which makes the furnace room a return air plenum for summer cooling.

Below is a detail of the exposed cooling coil and supply plenum. Compare with photograph on facing page.



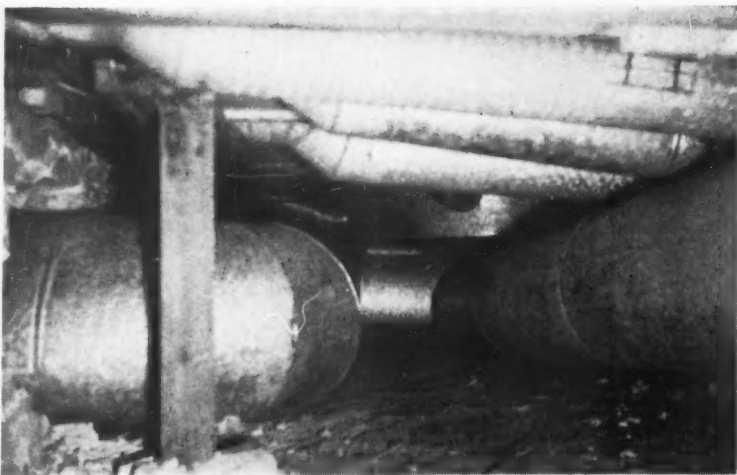
FRONT ELEVATION OF UNIT

ment. This eliminates all possibility of mold in the basement in wet weather and provides a cool laundry room.

Control for summer cooling is through a manual switch on the first floor. This switch starts the pump and the blower simultaneously; the system must be shut off manually. So far the system has been operated in this manner; the occupants starting the system whenever the house gets warm and stopping the system when the rooms are sufficiently cool. The blower, so far, has not been speeded up for summer cooling, yet with winter air delivery (3,000 c.f.m.) it has been possible to drop house temperatures below waste water temperature on a 90-degree day.

The system was used for cooling from the middle





Left—Flash photograph in unexcavated area where all duct work was connected. The large pipes are returns. The small pipes are supply. Above return pipes (background) can be seen an elbow in the stub-type "loop."

of July to the end of last summer and on all warm days this year. No relative humidity tests have been made, but the owner is well pleased with the results and can hold his 14-room house at 78 to 80 degrees without any difficulty and with intermittent operation. On most days a large amount of moisture is removed by the coil, indicating a reduction in relative humidity.

#### Winter Air Conditioning

The winter air conditioning side of the system is also of interest. The house, before this system was installed, was heated by stoves, so there were no registers or stacks in the building. To make the problem interesting, it was found that all outside walls were brick, built as a 8-inch outside course, then a 2½-in. air space, then a 4-in. inside course—14½ inches of wall. This proved an advantage, however, because where stacks were needed in outside walls, the inside brick course was cut away giving a chase 6½ inches deep. After the stacks were in place expanded metal lath was nailed across the chase for the plaster.

A new ceiling was installed on the first floor by nailing rigid insulation across the second floor joists. On the second floor the very high ceilings were cut down by installing new rigid insulation 18 inches below the old ceiling. To assist in cooling, the attic is now vented through a stationary ventilator.

By far the most difficult problem on this job was the task of getting the trunk and branch pipes installed. As shown on the plan, most of the area beneath the house is unexcavated and in the back portion of the house there is only two feet of space between joists and ground. Through this cramped area practically all the pipes had to run as shown and many days of patient cutting of sills, heavy stone walls and neck breaking work was required. One of the photographs shows a flash picture of this working space.

The procedure was to get in the stacks and stack or register boots. Then the sections of pipe were connected piece by piece as the mechanic backed away from the stack. The returns from the new bay windows (which extend beyond the old stone foundation wall) and all pipes to the front of the house were

Right—View of blower-filter cabinet directly behind the cooling coil. Through the doorway can be seen the duct door through which return air enters the furnace room prior to passing through the coil for summer cooling operation.

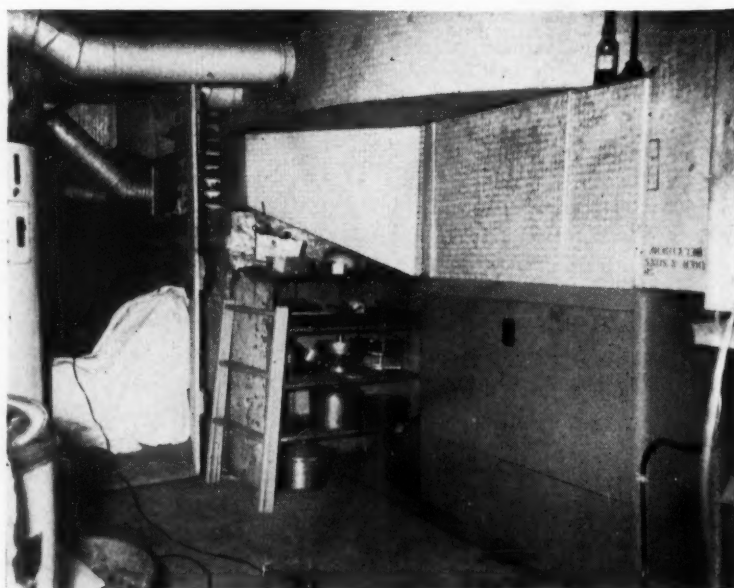
particularly exasperating because of cramped quarters. The pipes were all brought into the central area (also unexcavated) where the picture was taken and left open. Then the supply and return ducts off the furnace and blower were connected up in the furnace room and brought through the furnace room wall into this same central area. The final connection of pipes was made here using draw bands as shown in the photograph.

#### Design of Piping System

As to design, the original idea was to install a "loop" which would swing through this unexcavated area and permit all round pipe branches but this was found impracticable upon examination because of the cramped working quarters. So a modification of the loop was worked out whereby most of the supplies are taken off a large rectangular main which projects into the unexcavated area and is of a cross sectional area sufficient to make the trunk an extended plenum.

Each round pipe branch has a damper which was set upon balancing and has not been changed since either for heating or cooling. Registers are mostly in the walls just above the baseboard; two floor registers were used, and a few registers were placed 7 feet above the floor. Register location was worked out according to the owner's wishes with respect to furnishing. All wall registers are 22-degree downward deflecting. The maximum register velocity is 600 feet per minute. Interesting is Mr. Baker's statement that the registers were individually painted by the register manufacturers to match a sample of wall paper supplied by the owner for which a premium of about \$65 was paid.

The operation of the winter air conditioning system is controlled by one thermostat which starts and stops the stoker. The blower operates from a bonnet control which starts the blower at 160 degrees and stops the blower at 130 degrees. A high limit control stops the stoker whenever bonnet temperatures exceed 200 degrees. The winter comfort provided has been both economical and satisfactory in every one of the 14 rooms and no adjustments have been needed.



# Simple Cooling System in an Old House

LAST summer contractor George Bushman of Aurora, Illinois, was asked what kind of a cooling system he could install in the residence of a local industrialist. The house was almost two decades old; heated by a low pressure, gas-fired, steam boiler with free standing radiation in most rooms; rooms so arranged that partitions offered a real problem in getting any elaborate system of duct work through the walls.

The owner's chief concern was for cooling in the living room, library and master bed room, so arranged that the full volume of cooled air could be switched from living room to bed room-library or reverse, and, further, that in these three rooms continuous ventilation would be possible even though cooling was not needed.

Study of the situation and requirements resulted in the simple system shown on the layout. The  $\frac{3}{4}$  HP-1½-ton cooling capacity conditioner (Carrier) is suspended in the basement underneath the central hall. Air to the unit is taken out of the hall above through an 18 by 30-inch floor grille which had previously been installed to permit humidified air to enter the house from a basement humidifier.

From the unit a single, two-branch duct was run as shown. One branch, suspended around the outside of the photographic room, supplies the living room through one register cut through a radiator

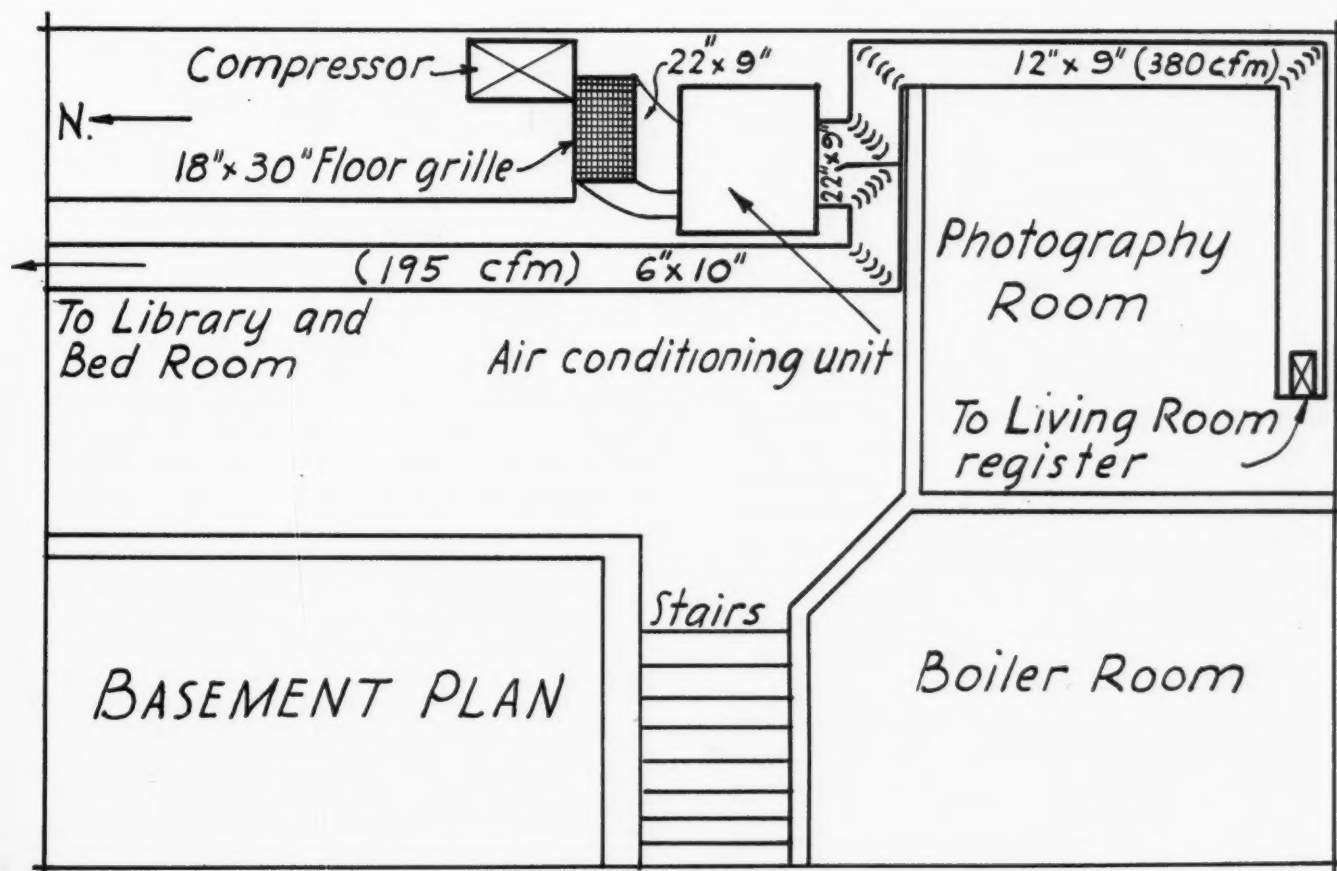
recess and directing the air upward to the ceiling. The other branch supplies the library on the first floor through two grilles cut through wall book cases 7 feet above the floor (grilles are on opposite sides of the room) and the master bed room on the second floor through a new floor grille.

The calculated cooling load at outside conditions of 95 degrees dry bulb and 75 degrees wet bulb is 14,000 Btu per hour. A total of 575 cfm at a register air temperature of 65 degrees is introduced when all registers are full open. One thermostat starts and stops the compressor from an adjustable setting which, during the cooling season, was set at 78 degrees dry bulb.

To secure the desired ventilation, the fan runs continuously.

Because of the restrictions of the basement, long, easy-sweep turns in the duct lines were impossible; therefore the ducts fill the corners of the rooms traversed and full, low resistance air flow is secured by the use of air turns in all elbows, as shown. All exposed duct work is insulated with one layer of air cell.

The owner's report on results for the last part of the cooling season (the installation was finished the last of August) indicated that the results desired were fully supplied by the system.





# Characteristics of Duct Systems and Fans\*

By S. H. Downs

Clarage Fan Co., Kalamazoo, Mich.

THE overall purpose of an air-conditioning system is the maintaining of desired and proper conditions in the spaces that are to be conditioned. This must be accomplished under a great variety of load conditions which will almost continuously vary due to seasonal changes, daily and hourly changes, sunshine changes, and changes of heat and moisture loads internal to the enclosure.

These variations of load on the system must be met by the proper treatment and handling of the air which is circulated and which serves as a carrier of

- (1) heat to or from
- (2) humidity to or from and
- (3) dust from

the conditioned spaces.

In addition to the proper treatment of the air to perform the carrier functions listed, it is very important

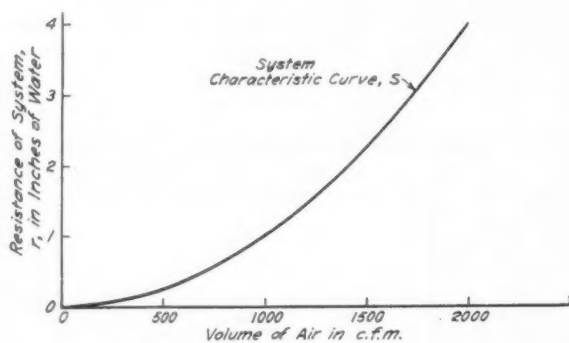


Fig. 1

to have a clear conception of certain fundamentals governing the flow of the air through the conditioning system, and how these operating requirements can be met by forced circulation by means of fans, so that it is possible to put the conditioned air where you want it, when you want it there, and in the desired quantities.

Systems for handling and treating air are almost infinite in variety, but their consideration is greatly simplified if we limit our discussion to the ordinary range of air-conditioning work; that is, to systems in which the changes in the density of the air while passing through the system are not great.

The majority of air-conditioning systems can then be said to follow the simple relation

$$r = k (\text{cfm})^2 \dots\dots\dots (1)$$

\*Paper delivered at the Second Conference on Air Conditioning, University of Illinois, Urbana, Illinois, March 8 and 9, 1939.

Where  $r$  = resistance of system, inches water gage  
cfm = cubic feet per minute

$k \pm$  a constant

When a statement is made that, in connection with a system, a certain volume of air per minute is to be handled against a certain resistance, a complete definition of the system characteristic curve has been given, if it is clear that the system is of a type that follows Equation (1), and the data for this curve can easily be derived as follows:

- 1000 cu. ft. per min. at 1 in. water gage is specified  
Then, for  
500 cu. ft. per min.,  $r = \frac{1}{4}$  in.  
1500 cu. ft. per min.,  $r = 2\frac{1}{4}$  in.  
etc.

Plotting of these data will give us a system characteristic curve as shown in Fig. 1.

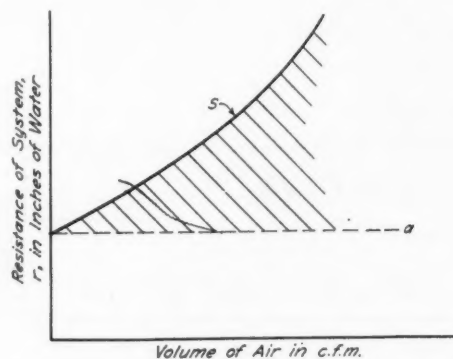


Fig. 2

A different type of system characteristic applies to those conditioning systems that are installed with constant pressure regulators to maintain a constant static pressure on the discharge side of the fan. In this case, there are often a number of branch ducts, some of which may not be in use at times, and it is desired to prevent an increase of flow in the ducts in use without rebalancing the system or changing the speed of the fan.

We now have a system which will have a constant resistance on the discharge side of the fan, but that part of the system on the inlet side of the fan will follow the relation given in Equation (1). We can draw a composition system characteristic as illustrated in Fig. 2.

The line  $a$  represents the value of the resistance of the discharge side of the system, which remains constant for varying rates of air flow, while the sectioned area above  $a$  shows the added resistance for varying flow due to the inlet side of the system.

The curve  $s$  is the system characteristic obtained with the system influenced by the pressure regulator.

Further and more complicated variations of system characteristics are met with in other types of applications such as mechanical-draft, oven-drying systems, heat-treating systems, etc., which will not be discussed, as they are not pertinent to the subject in hand.

It is apparent, however, from the two cases illustrated that composite system characteristics can be derived simply by adding together the characteristics of the several parts of the systems. One must recognize which parts follow different relationships, and what these are.

In the discussion so far, we have tacitly assumed that it is only necessary to state that a system will have a certain resistance for a given rate of flow of air in order to have it that way when the system is installed. It is obvious from experience that this is far from the case, and therefore it becomes of interest to look further into the matter of what we may have after the system is installed. To do this, we must first consider some of the characteristics of fans, and these will be centrifugal fans, since propeller fans have only a limited field of application in this work.

#### Free Air Delivery Is Meaningless

When considering the applications of fans, it should be kept in mind that "free air delivery" is absolutely meaningless, since the fan always operates against some resistance, whereas "free delivery" is a theoretical condition never attained on any installation. In addition, two fans may have the same free air delivery at a given speed of operation, but the pressure-volume characteristics may be entirely different, even though the two fans may look alike externally. This condition is illustrated by the constant speed curves in Fig. 3.

Fans 1 and 2 have the same free air delivery, as shown at point  $A$ . Due to the more rapidly rising pressure characteristic of fan 1, it would handle more air than fan 2 when put on a system, since it is capable of delivering more air at a given static pressure as illustrated by points  $B$  and  $C$ .

It is therefore apparent that complete performance characteristics of the fan must be known. In addition, the methods of manufacture must be such that fans of the same design and size are exact duplicates, or the performance characteristics will be changed.

The same basic laws of fluid flow which govern the flow and delivery of the air through the system also govern the performance of the fan, and therefore the

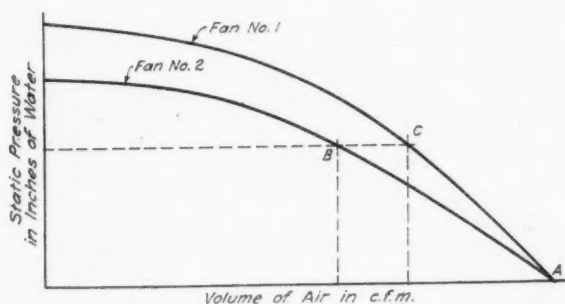


Fig. 3

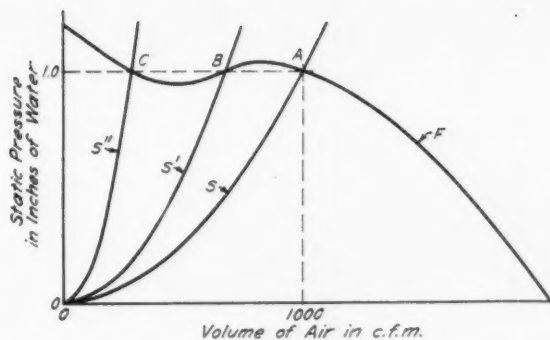


Fig. 4

fan is very accommodating, in that it will perform as the system to which it is attached dictates. This does not mean that the fan will perform in accordance with what someone *states* is required by the system. It means that the fan will perform as required by the system as *actually installed* and these two requirements may be quite different.

#### Meaning of Water Gauge Pressure

When one states that the fan is to deliver 1000 cu. ft. per min. at 1 in. water gage static pressure, it means that the fan is to be attached to a system which has a resistance of 1 in. when, *and only when*, 1000 cu. ft. per min. are flowing through the system, the air being at a standard air weight of 0.07488 lb. per cu. ft. For an actual system not yet installed, this statement necessarily is only an estimate, but it must be treated as a true statement of the system characteristic.

In Fig. 4, a constant-speed fan curve  $F$  is shown for constant air density. This particular curve is characteristic of shallow, forward-curved blade fans, and illustrates a condition that is sometimes confusing when taking ratings of fans of this type from a catalogue capacity table.

The specified system characteristic curve,  $s$ , intersects the fan curve  $F$  at only one point  $A$ , which is the point of operation. In a capacity table, it may be found that three different volumes can be read for the same r.p.m. at the same static pressure, corresponding to points  $A$ ,  $B$  and  $C$ .

The question then arises which of these volumes will be delivered by the fan? The question is answered by the system. If the system is such that curve  $s$  defines the system, then the volume at  $A$  will be delivered. If the same fan at the same speed is put on another system whose characteristic is  $s'$ , the point of operation is determined by the intersection of  $s'$  and  $F$  or point  $B$ . If still another system with characteristic  $s''$  is used, the point of operation will be at  $C$ .

In no case, however, does the fan choose which volume it will deliver. It is governed entirely by the system, and only one volume can be delivered through one system. It should be noted in this connection that the movement of a damper or any other change affecting the resistance of the system, makes it a different system. A system can change its characteristics with the passage of time, as exemplified by the change of resistance in a filter as its passages gradually become clogged by the collection of dust.



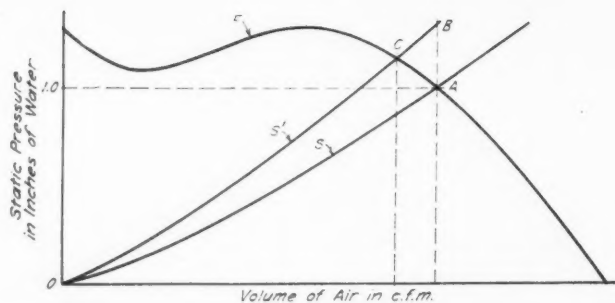


Fig. 5

The effect on the fan performance of the last-mentioned change is shown in Fig. 5.

Assume that *A* represents the point of operation when the system is first installed. After the resistance of the filter has increased, the resistance of the system has changed from *A* to *B* for the same volume flowing and the system characteristic has changed from *s* to *s'*.

The fan will operate at point *C* where *s'* intersects the constant speed fan curve.

### Fan Characteristics

There are certain characteristic laws of fans that are important, especially where changes are required after the installation is made. For a given design and size of fan on a system with characteristic represented by Equation (1).

- (1) c.f.m. is proportional to r.p.m.
  - (2) s.p. (static pressure) is proportional to r.p.m.<sup>2</sup>
  - (3) b.h.p. is proportional to r.p.m.<sup>2</sup>
- and at constant speed
- (4) c.f.m. is constant with air density
  - (5) s.p. is proportional to air density and inversely proportional to absolute temperature
  - (6) b.h.p. is proportional to air density and inversely proportional to absolute temperature
  - (7) air density varies with (a) temperature  
(b) relative humidity  
(c) barometric pressure

If the system characteristic is estimated incorrectly, a situation may arise such as is shown in Fig. 6.

*A* is the desired point of operation, and *F* is the fan curve at the operating speed of the fan. The system characteristic through *A* intersects the fan curve at *B* giving a volume of air that is too small.

The horsepower required by the fan is shown at point *C*. In order to increase the delivered volume from *B* to *A*, it would be necessary to speed the fan up until it gives the fan curve *F'*.

If the volume at *B* is 1000 cu. ft. per min. and the desired volume is 1200 cu. ft. per min., then, from the laws previously stated:

$$\text{r.p.m.}_A = \frac{1200}{1000} \times \text{r.p.m.}_B$$

$$\text{b.h.p.}_A = \left( \frac{1200}{1000} \right)^3 \times \text{b.h.p.}_B = 1.73 \times \text{b.h.p.}_B$$

(b.h.p.<sub>B</sub> is shown at point *C*)

or the horsepower required to get the 20 per cent increase in air volume would be 73 per cent greater than the horsepower required for the original volume.

These figures illustrate the necessity of using conservatively and accurately rated fans, and for not underestimating the system resistance.

The laws of fluid flow as applied to air can be considerably abridged when applied in this field, inasmuch as the variation of the air density is not through a very wide range, since neither very low nor very high temperature are reached. For ordinary application work, no large errors will be introduced in figuring resistances from charts made out for standard air density. It should be kept in mind, however, that these charts are not accurately applicable to other air densities without the use of correction factors.

### Air Measurement Problems

It is impossible to obtain accurate measurement of air flow in the field with any type of instruments, as can readily be seen by comparing the conditions on any installation with the conditions that are set up for laboratory work by the Standard Test Code. Probable accuracy on an installation under good conditions is plus or minus ten per cent. Errors may be much larger in some cases, being dependent on the conditions of flow at the points of measurement.

Other characteristics of fans that must be considered are

- (1) Noise
- (2) Cost
- (3) Dimensions
- (4) Arrangement

Noise is not a function of r.p.m. alone, or outlet velocity alone, or tip speed alone, but is a function of a combination of outlet velocity, tip speed, dimensions of all air passages, and workmanship.

Noise may originate in almost any part of a system.

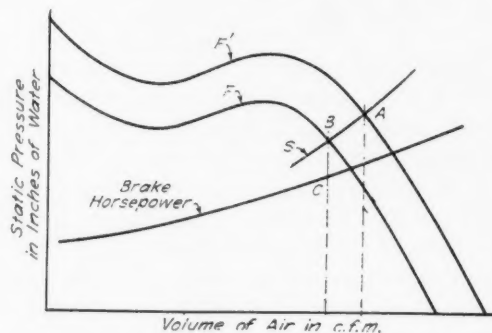


Fig. 6

It may come from (1) any of the air passages (including equipment) (2) bearings, (3) set collars, (4) drive, (5) motor or motor control, (6) unbalance in rotating parts, (7) misalignment of equipment, (8) improper mounting of equipment (9) loose connections, (10) other sources peculiar to any specific installation.

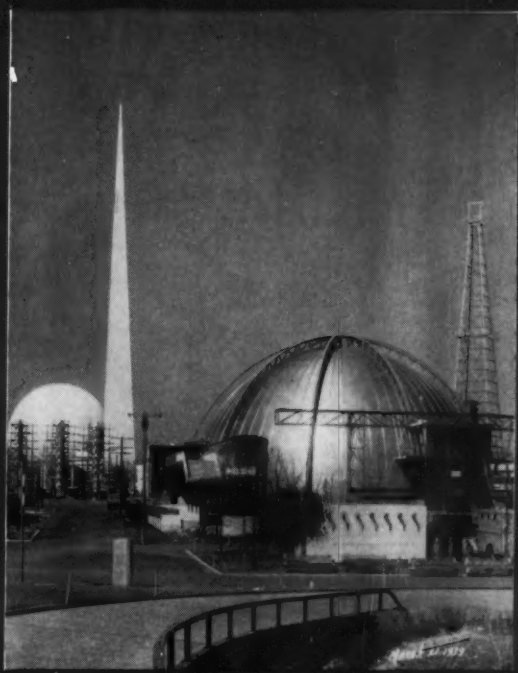
Cost in general will be lower if standard designs are used instead of special designs.

Dimension limitations vary with the particular application, as does also the arrangement, as the fans may be built into the main assembly in various ways or may be set up independently.

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# SHEET METAL

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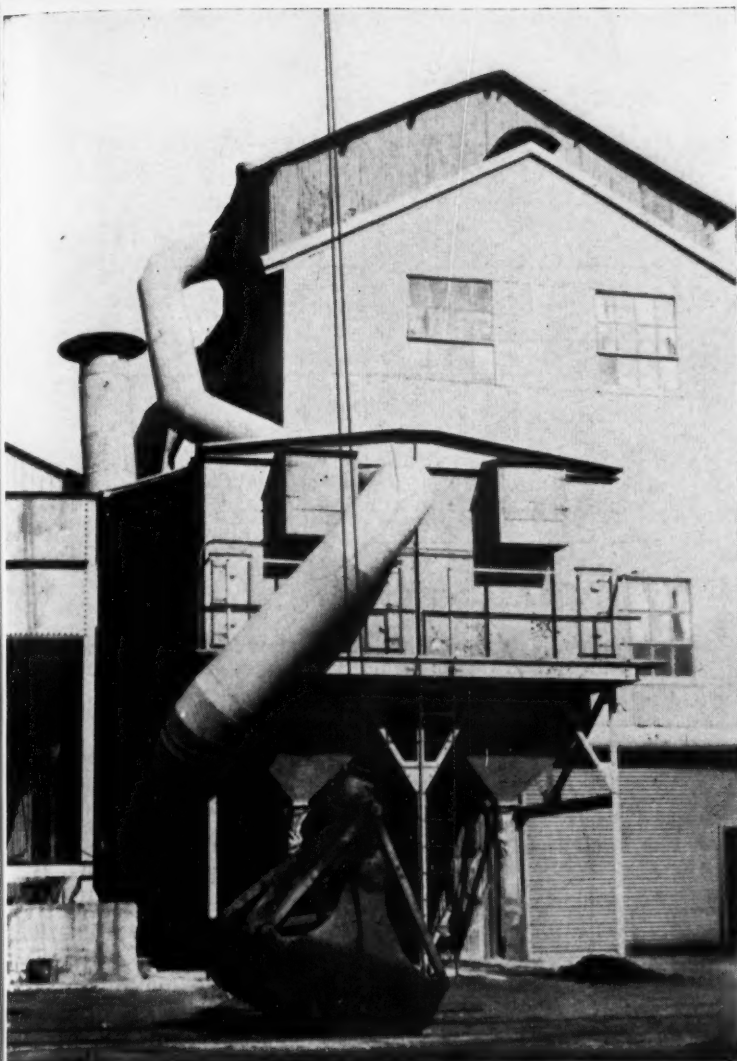
**BETHLEHEM STEEL COMPANY**





# Bag-Type Dust Collector Stops Fine Stone Dust

By R. C. Nason



The original cyclone is housed in the tall building behind (see pipes in and out). The new bag-type separator is in the lower building in front. The sloping pipe runs down to the blower. The capped pipe is the air exhaust from the blower.

A RECENTLY installed industrial dust collection system of more than passing interest is that handled by the Great Neck (N. Y.) Sheet Metal Works in collaboration with Parry Engineering Co., New York City, agents for Parsons arrestors, in a large asphalt plant. The road contractor who purchased the installation for its Great Neck road materials plant is Crampton Bros., of this village.

## The General Problem

Although the road builders had tried faithfully to capture fine stone dust and had installed for the purpose one of the largest steel plate, cyclone separators in this area, escapement of refuse was pronounced. So objectionable, in fact, that its settlement on neighbors' lawns and flower beds resulted in destruction of both. In response to complaints the Crampton Company turned to Charles Meunier, proprietor, Great Neck Sheet Metal Works, who advised the purchase and installation of a special patented arrestor.

The road contractor in this case, it should be explained, not alone builds and repairs local highways but manufactures surfacing materials such as asphalt. This material, made at its best, incorporates stone

chips, cement and similar materials. Trap rock, Dolomite, sand and the other basic materials used have to be dry if the finished product is to be lasting when applied to highways.

So, one of the prime operations at this plant is the drying of trap rock, Dolomite and sand. This is effected in a large oil-fired rotary drier of universal type, that is, one that can be fired at either end. In the drying process moisture and light dust are driven off the rock.

## Cyclone Fails to Satisfy

The original method of trying to capture the dust was by the installation of a  $\frac{1}{2}$ -in.-thick steel plate cyclone separator. The unit is 30 ft. high and 12 ft. in diameter. Experience soon demonstrated that whereas this type of collector operates well enough in separating coarse dust and stone chips, fine dust cannot be held and deposited in this design. It was the release of the fines that caused local complaints. Sheet Metal Contractor Meunier, when appealed to, knew from experience that good results under such circumstances can be had from arrestors wherein dust laden air has to pass through internal bags, tubes and small cellular compartments of types now being installed most everywhere. This type of separator, with few exceptions, can be counted on to break up velocity of air passing through the bags so fully that fine dust is deposited.

The double Parsons arrestor chosen, when handling about 15,000 cu. ft. of air per min., well loaded with dust small enough to pass, for the most part, through 200-mesh screening, extracts practically 100 per cent of the dust. The discharged air from this system, as now in use, contains no visible dust whatsoever. Neighbors' complaints have vanished.

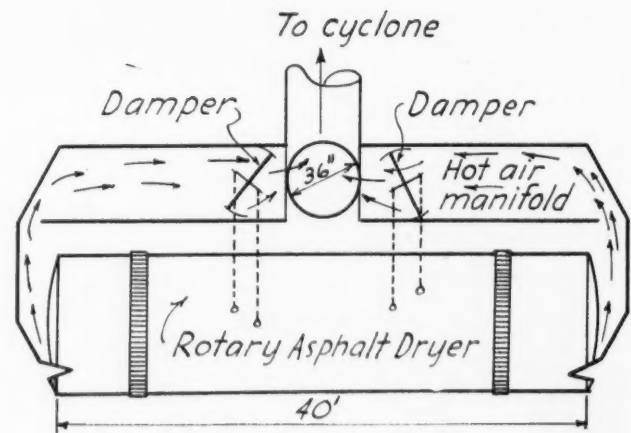
The 30-ton-per-day rotary drier in the Crampton asphalt plant is almost 40 ft. long. The dust collection

system not alone must exhaust the drier dust, but also hot gases, for the air extracted from the drier is some 400 deg. F. As a preliminary to the hot-air and dust extraction there is a 42-in.-diam. manifold, or air chamber, laterally placed directly above the drier. This is of 14-gauge steel. Its ends connect to the drier, and it is also connected to the drier centrally and on the drier's side.

The outlet from the manifold to the mechanical dust collection layout likewise is central and on the side of the manifold, the opening being 36 in. in diameter. By hand operated dampers in the manifold, placed near and on either side of the manifold air outlet, one-half of the manifold may be cut off. This is done in practice. If both drier ends are fired simultaneously both manifold dampers remain open.

#### The Conveyor System

As already said, the manifold outlet duct, 36-in. in diameter, passes upward some 40 ft. to the inlet of the aforesaid large cyclone separator. As the dust enters the cyclone inlet, which is 24 in. x 42 in., there are three smaller ducts joined into the 36-in. These are 10-in. each, and they come from a screen, from the

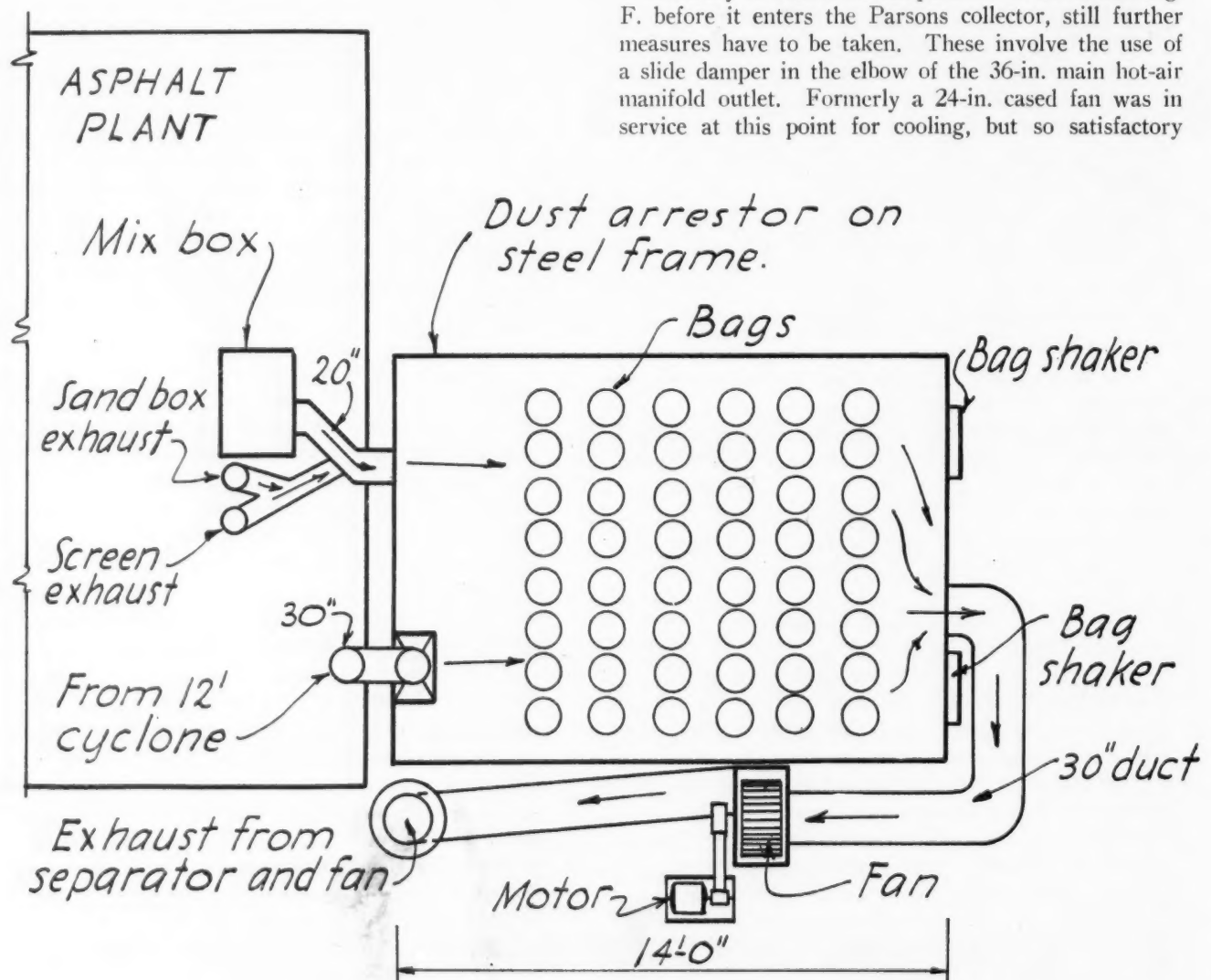


SIDE ELEVATION OF DRYER

Rough sketch of the hot air manifold surrounding the stone drying kiln. From this manifold the air passes first to the cyclone, then to the separator.

top of a mixer and from a sand box, all located near the roof of the corrugated sheet steel plant.

There is a good point about this duct arrangement, namely that the mixture of relatively cool air with the hot air from the drier lowers air temperature. As it is necessary to reduce air temperature to about 200 deg. F. before it enters the Parsons collector, still further measures have to be taken. These involve the use of a slide damper in the elbow of the 36-in. main hot-air manifold outlet. Formerly a 24-in. cased fan was in service at this point for cooling, but so satisfactory



GENERAL PLAN OF DUST ARRESTOR





At left—Exterior of the shop and office of the Great Neck Sheet Metal Works. To install the collecting system described in this article, the proprietor, Charles Meunier, collaborated with Parry Engineering Co., New York. The analysis and completed system have proved highly successful.

At right—Some idea of the amount of stone chips (from cyclone) and fine dust (from arrestor) collected in a two-weeks period. Before the bag-type arrestor was installed, practically all the fines were deposited over neighboring lawns and gardens. The new system has stopped all complaints.



have results been of the sort indicated that the fan has been removed. There is a further drop in air temperature in its passage through the Parsons arrestor so that exit-air temperature now is 140 deg. F.

The top air outlet of the large cyclone passes directly to the top, rear edge of the Parsons arrestor. The duct is 30 in. in diameter, but a special rectangular transmission piece completes its connection to the patented arrestor, which makes it a draw-through arrangement. There is an additional air intake to the arrestor, 20 in. in diameter and made up of two 10-in. branch ducts taken from the plant's materials mixing box.

The outlet from the arrestor to the fan inlet is evident in an accompanying illustration. This is 30 in. in diameter and remains this size to the fan, whose discharge duct, which is the same size is carried some 30 ft. vertically to discharge directly to the atmosphere through a plain weather cap.

The fan, not readily discernible in photographs, is of

Buffalo make, belted to a 10 h.p. motor and has up-blast discharge. One might assume erroneously that the stone dust collected in the Parsons arrestor has no salvage value. This is not, however, strictly true as it can be used in combination with other materials for making certain types and qualities of road surfacing such as patching. Its average salvage value is listed as \$3.00 per ton. Considering that some 40 bags of the dust are collected daily during about 45 weeks of the year, it is estimated that salvage value is about \$1,250 yearly.

Thus in two years or so the cost of the modernized collection system has been earned. The approximate weight of the collected waste is 60 lb. per cu. ft. and it requires about 3,500 lin. ft. min. velocity of air to conduct it. Between the large cyclone and the inlet of the arrestor air velocity is lowered considerably, while air passage through the 400-odd 9-in. bags of the arrestor further reduces its rate of flow to barely 1,000 ft. min. at point of discharge.

## "I Am Always Spouting"

LOCATED on the banks of the Ohio River, in the downtown business district of Marietta, Ohio, C. O. Carpenter finds this different looking business front creating interest for a necessary, but difficult to advertise line of business, tinsmith, roofing and sheet metal work.





Closeup and over-all photographs of one side of the annex showing half-circular and square conductor heads and the gutter in place in the step in the wall.

## Fabricating Details for a Copper Drainage System

**A**PPROXIMATELY 2,000 pounds of 16-ounce hard rolled copper was fabricated and installed by the Alga Reece Sheet Metal Co., of Rockford, Illinois, for the new addition to the Genoa City, Wisconsin, public school. The copper was used in attached gutters, conductors, conductor heads and rising wall flashing.

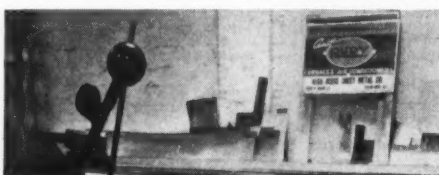
The contract, while not large, is interesting because of the careful design to provide for expansion and contraction in the gutters and the pleasing circular conductor heads specified by the architect. On the new addition there is about 380 feet of attached gutter and an equal footage of flat strip copper, 6 inches wide, used as cap flashing. There are four large and square conductor heads and 18 large

and 3 small circular conductor heads. To carry the water out of the gutters and off the flat decks required an additional 300 feet of 3 by 5-in., 16-ounce, corrugated conductor pipe.

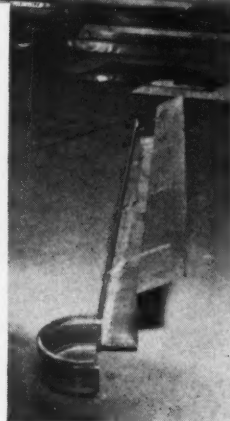
The roof of the new addition is rolled asphalt roofing; the building wall is brick and a step was provided in the wall to take the gutter. This is shown in one of the photographs. The gutter was fabricated in 8-foot lengths of an outline as shown in the detail drawing. The full girth of the gutter was made in one 27-inch piece of copper, thus avoiding any longitudinal seam.

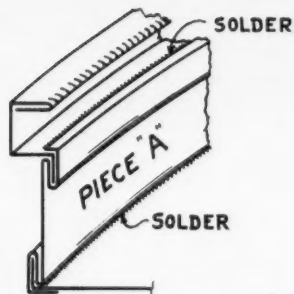
The upper edge of the apron was turned back  $\frac{1}{2}$ -inch to take the cleats on one foot centers. No stiffening bar was used in the outer edge, but this

Below and center—Group of half-circular and square heads, outlet tubes, and a section of gutter with attached half-circular head after fabrication awaiting shipment.

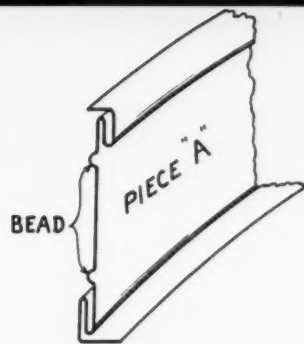


Below—Pieces of a gutter expansion joint assembled on the bench to show design. Compare with sketches on facing page.



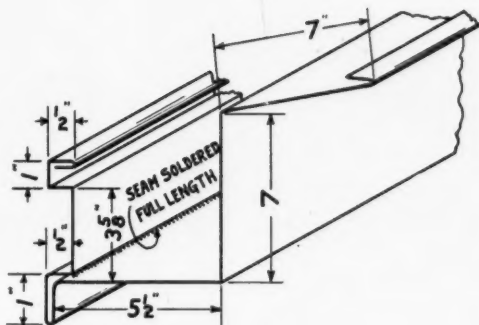


MAGNIFIED CROSS SECTION  
OF 1/2 CIRCULAR HEAD

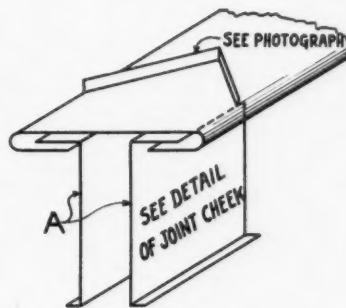


DETAIL OF FOLDS  
FOR PIECE 'A'

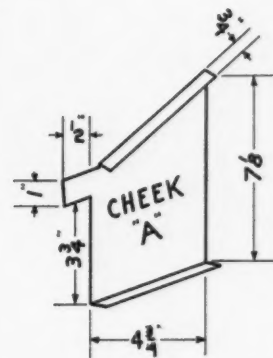
Shop sketches showing pieces for half-circular heads, expansion joint with cover and assembly. Note seams and soldered joints used.



CROSS SECTION OF GUTTER



TYPE OF EXPANSION JOINT  
CROSS SECTION



DETAIL OF JOINT CHEEK

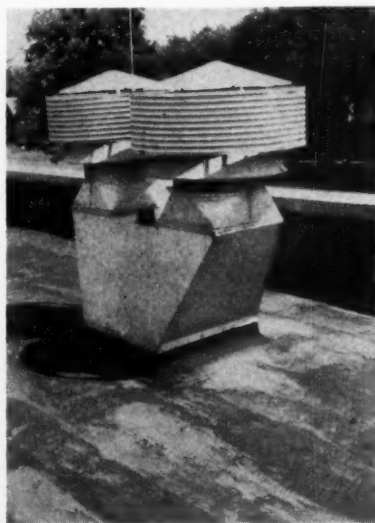
edge was molded as shown to be self stiffening. The supporting straps were made of 10-gauge iron, plated and twisted as shown in the photographs and were spotted every 24 inches along the gutter.

The type of expansion joint used is standard construction, except that a nose was cut into the forward edge. This nose fits into the front stiffening edge of the gutter. These expansion joints were placed every 30 feet along the gutter. The cap has a saddle, soldered in the shop and the cap extends upward to the edge of the apron. The gutter, in place, with its moulded upper edge and drip, is quite ornate in appearance despite its simplicity.

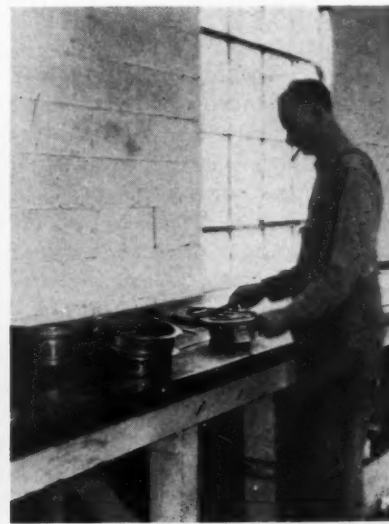
The circular conductor heads were made up of two rim pieces, a side piece, and a bottom as shown in the sketches. These pieces were formed as

shown in the detail, assembled and soldered as one of the mechanics is doing in one of the pictures. These heads, as shown in the photograph of a gutter section and head laid on the shop floor, project for the full radius beyond the face of the gutter. The gutter sections are seamed into the head and a supplementary piece joins the two gutter sections together and contains the hole for the leader pipe. One of these joining sections is shown in the photograph of the expansion joint pieces assembled on the bench.

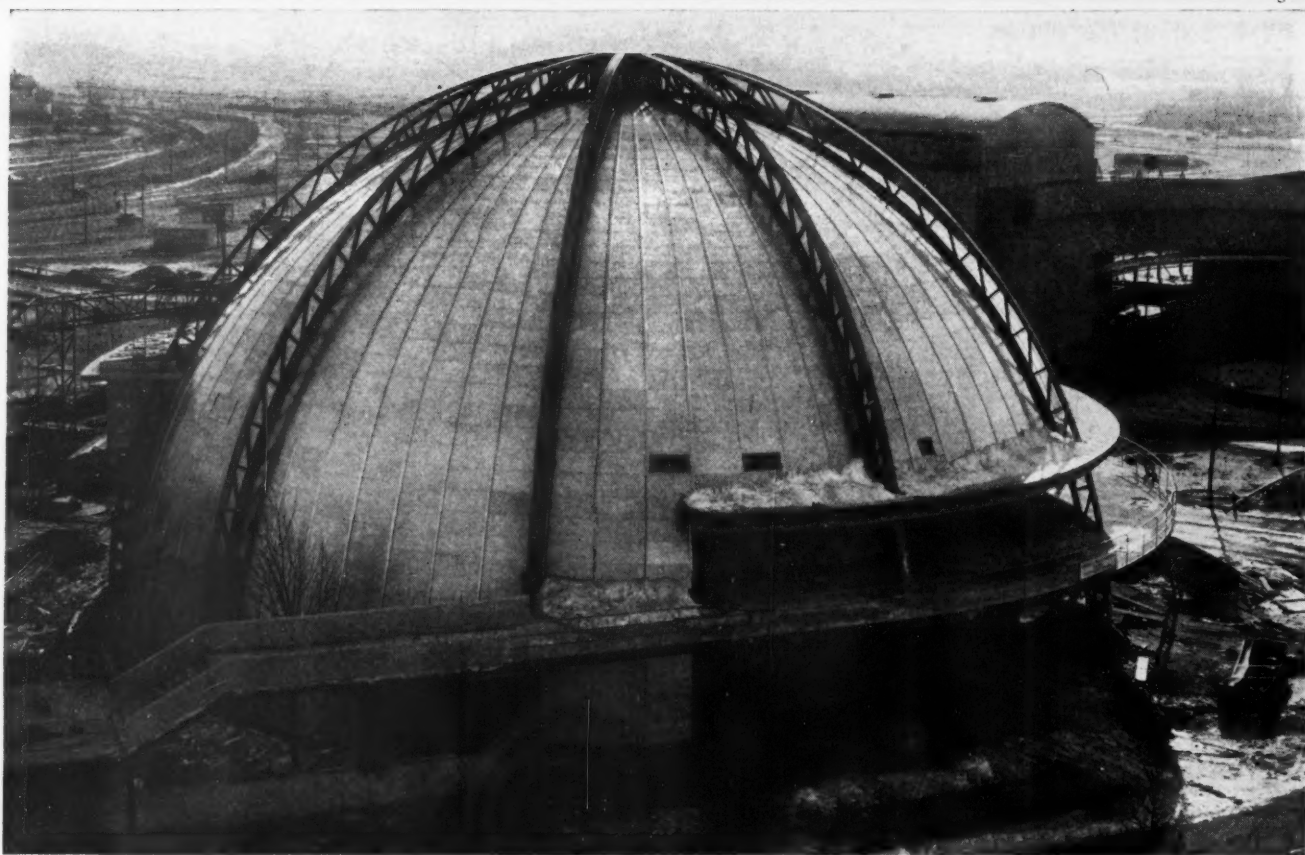
The rectangular conductor heads (as shown in one of the photographs) follow standard design, with almost no ornamentation. The conductor pipe straps are 3-inch wide, special ornamented bands, on bronze bars.



Left—Several large ventilators were included in the Reece contract. Center—Mechanic is soldering front gutter edge to stiffen section (see detail above). Right—Mechanic assembling formed pieces of a half-circular head preparatory to soldering.







## Stainless Steel Dome Covered From the Top Down

**O**UTSTANDING among the unusual buildings of the New York World's Fair is the architectural innovation—an "inside out," perfect hemisphere—of the United States Steel Corporation. The great dome measures 66 feet high by 132 feet in diameter and is covered with 28,000 square feet of shining stainless steel.

The exterior is unusual in that the structural trusses are uncovered, while the dome proper "hangs" underneath these trusses. Inside are two floors of exhibits graphically demonstrating the vital part steel plays in the life of every man and how, through research, steel is helping to shape the World of Tomorrow.

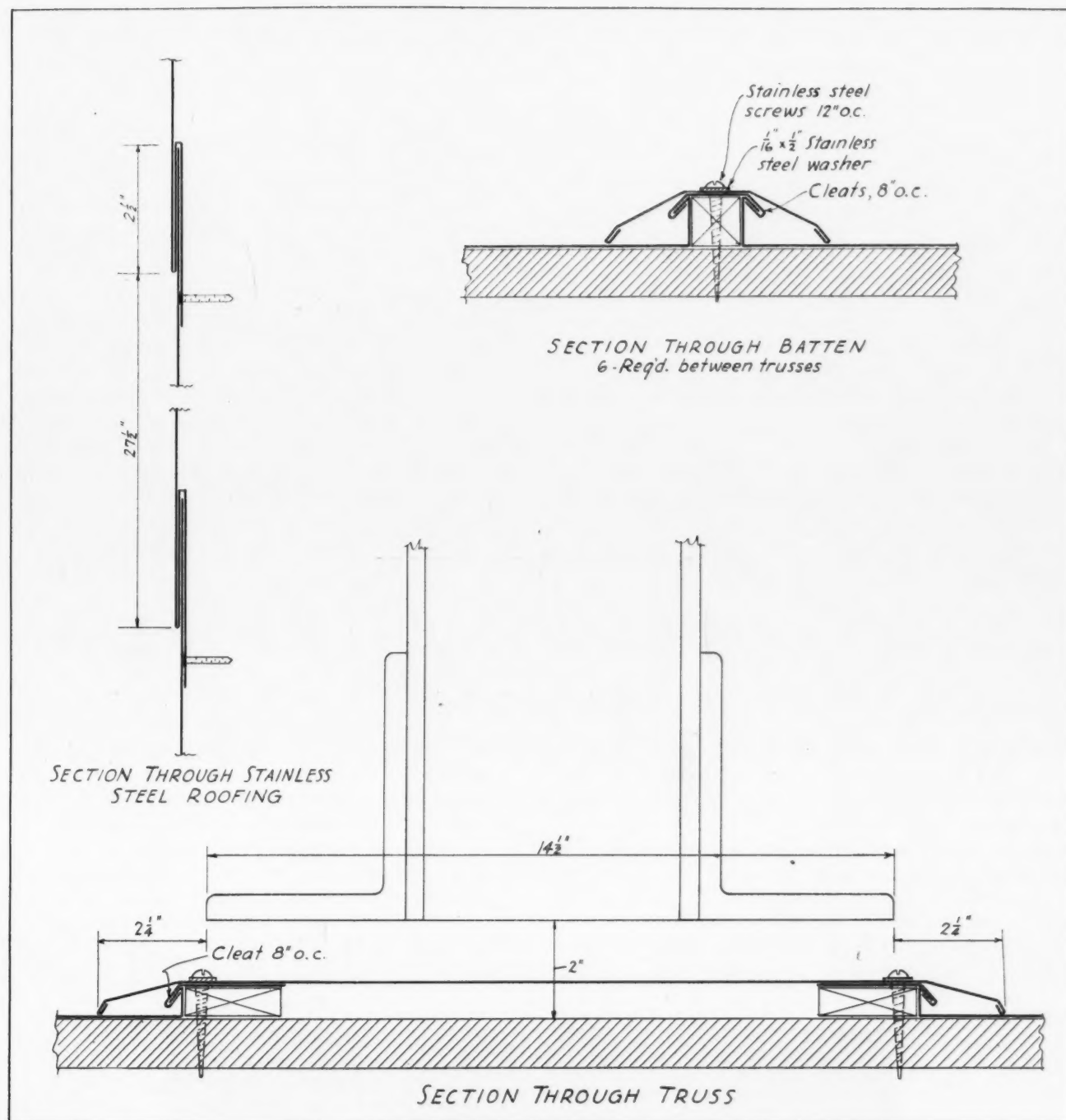
Walter Dorwin Teague designed the Exhibit; associated with him was George F. Harrell. York and Sawyer were the architects. The sheet metal contract to fabricate and erect the dome was awarded to Jacob Ringle & Son, Inc., Jersey City, N. J.

The photographs and drawing show the general features of sheet metal application. Each pair of

trusses forms a panel and in each such panel there are seven equal sections. Each such section tapers from 72 inches wide at the base to 10 inches wide

Above—General view of the dome showing the panels between exposed trusses and the sections in each panel. The detail sketch facing shows construction. Below—Closeup of dome with batten caps clearly showing and special batten construction beneath the structural ribs.





These details show horizontal seams used which made possible the covering of the dome from the top down. Also, design of batten with attached "umbrella" cap and the double batten with wide cap used beneath the structural trusses.

at the top. The sheets which make up each section are all uniform in width,  $27\frac{1}{2}$  inches exposed, as shown in the detail drawing.

To establish the dimensions of all the sheets in one section from which dimensions all the sheets in all the sections were formed, the Ringle company says—"To divide the dome into panels and get our sheet dimensions, we divided the distance between each set of trusses into seven equal sections, starting at the base of the dome and marking the seven divisions approximately every eight feet at the base of the dome and tapering to about 10 inches at the peak.

"Over these markings we nailed 1 in. by 1 in.

wood battens from the top to the bottom of the dome. We then measured off the required sheets in the panel every  $27\frac{1}{2}$  inches between battens. This method is practically the same as the wire method recommended in Standard Practice in Sheet Metal Work.

"With dimensions laid out we needed for the dome—

574 sheets, 6 in. by 96 in.  
112 sheets, 24 in. by 96 in.  
646 sheets, 30 in. by 72 in.  
975 sheets, 36 in. by 96 in.

"In addition, 100 sheets of 36 in. by 120 in. were

used for the curved corrugated walls, wainscoting and trim in the Executive Lounge.

"The sheets received in sizes indicated above were fabricated in our shop on the power shears and presses and delivered to the job cut to size ready for application. All the stainless, incidentally, is 22 gauge, Number 6 finish."

The application of the sheets was unusual in that instead of starting at the bottom and working up, Ringle started at the peak and worked down to the base. This was made possible by the method employed to hold the sheets on the dome. The detail shows this construction. It will be noted that each sheet is held in place by cleats on 8 inch centers nailed to the bottom of the sheet rather than the top. The top of the sheet below is then slipped into the loose fold at the bottom of the sheet above, covering the nail and cleat of the sheet above. The deep fold locks the sheet edge.

The seams which run from base to peak are batten type with an extra and floating cap. The exact

construction is shown in the detail. These vertical seam cleats are also on 8 inch centers and are laid across the wood batten to hold both standing edges against the batten. The cap, which is so formed that the edges are in compression against the pan sheets, is then tightened down with the stainless screw and washer shown.

Beneath the structural trusses a somewhat different construction was used as shown in another detail. Two battens are used here with single cleats and a wide cap.

Of the application the Ringle firm says—"The dome was constructed of  $\frac{7}{8}$  in. wood sheathing over which we laid one layer of 30-pound asphalt saturated felt and wood battens as shown. The stainless steel sheets were applied starting at the top of the dome and working down using locks as shown. This was done to avoid any possible scratching of the sheets. Our scaffolding was removed as we worked down so that no scaffold parts rested on the finished work."

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## Ball-in-Channel Track Handles Heavy Sheets

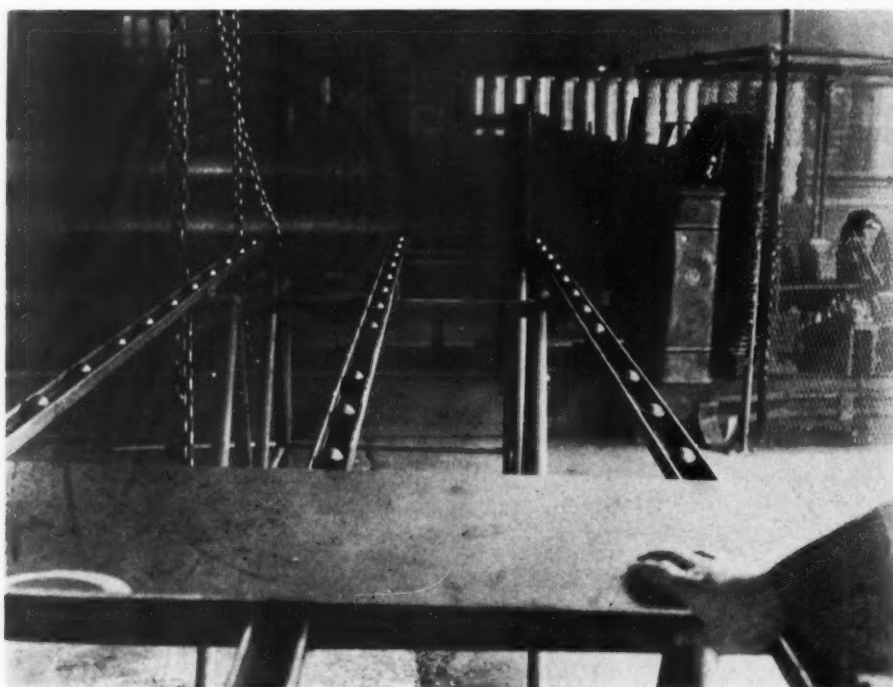
By Joseph C. Coyle

**M**ETAL balls may be used in several ways to facilitate the handling of large, or heavy, plates or sheets of metal, either in feeding the sheets to rolls, as shown here, or moving the sheets about a punch press shear, or other machine.

In this shop, the balls are held in small metal bands, welded inside the flanges of the channels. The balls may also be mounted in a similar manner and a second channel inverted and welded to the

base channel, leaving a bit of the balls projecting through holes in the top channel. This latter method aids in lubrication and keeps out dirt.

A series of balls, mounted as described, in a pair of channels say two or three feet long, may be bolted to the top of a wood or metal trestle and used all about the shop for moving heavy material, or a single ball can be used in the top of a tripod stand.







Oxy-acetylene welding a corner of a stainless steel container. Note heavy angles and clamps which form a simple jig yet, despite simplicity, a rigid assembly. Photo by courtesy of Republic Steel Corporation.

## Fundamentals of Sheet Metal Welding\*

OXY-ACETYLENE welding has become an important process in the fabrication of sheet metal products. Drastic savings in material and fabricating equipment costs, as well as the attainment of a product of vastly improved quality, have been made possible through the efficient use of the process. Effective utilization of the inherent advantages attending fabrication of sheet metal products by welding naturally requires a thorough understanding of the fundamental principles involved. These will be described in some detail and practical suggestions will be made with regard to methods for handling all phases of the work.

It would be well first to classify the sheet metal field. It is most generally accepted that the limiting thickness of sheet metal is 11 gauge, or  $\frac{1}{8}$  in. Most all metals available in sheet form—steel, alloy steels, Monel metal, aluminum, copper, brass, some of the bronzes, and lead—are used by the sheet metal fabricator. Each of these metals entails individual problems in design, layout, cutting, forming, and joining. Because of space limita-

tions here, however, the following discussion will refer specifically to steel and ferrous alloys.

### Advantages of Oxy-Acetylene Welding

In planning the fabrication of sheet metal equipment, consideration should first be given to the method of joining the various members. The choice of the method of joining is determined, primarily, by the service requirements for the particular piece of equipment involved.

Oxy-acetylene welded joints provide the strength, ductility, and resiliency demanded by practically any service condition. Since it is resistant to corrosion and not subject to disturbance by operating stresses, the welded joint is permanently leakproof. Moreover, it is simple in design and gives the appearance of a single piece of metal except where reinforcing may have been considered necessary. This reinforcement is generally removed by filing or grinding, after which the location of the welded seam will not be evident even

\*Reprinted by permission from Oxy-Acetylene Tips, April, 1939.

upon very close inspection. In consequence, the welding process assures a neat appearing, light joint in place of a heavy, bulky, and unsightly mechanical joint.

In addition to the improved quality of the joint, there are many other advantages to be gained in fabrication of sheet metal products by oxy-acetylene welding. These advantages represent savings in production cost, and, naturally enough, go hand in hand with the improved quality of the joint as well as of the welded product as a whole. By "improved quality of the welded product as a whole," is meant those qualities of the welded joint itself plus the greater precision with which the fabricator can work in joining by welding the various sheet metal members.

### Factors Affecting Design

Economies in production are often the result of short cuts in design. Consider, for example, the very simple problem of making up a sheet metal box as shown in Fig. 2. It may be assumed that the box must be leak-proof, that it will be subjected to rough usage, or that it must be built with precision. Any one of these conditions suggests, if not demands, the welded joint. The problem then resolves itself into a choice of one of the three design layouts. Of the three, design *A* involves the least amount of welding—four vertical corner welds, and four horizontal diagonal corner welds. Design

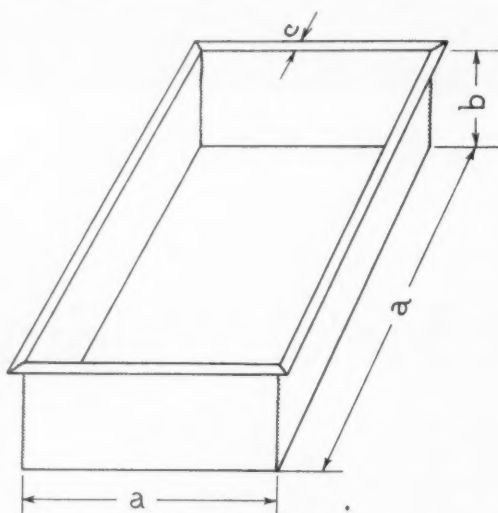
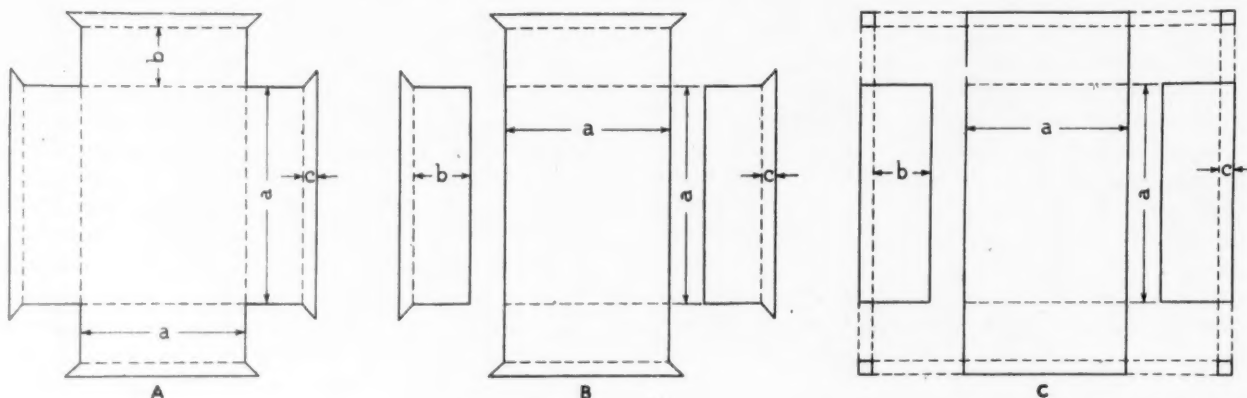


Fig. 2—Sketches A, B, C, indicate three methods of designing a sheet metal box (shown completed above) for fabrication by welding. The text explains the factors which determine which blanking method is most economical of time and material.



*B* adds to *A* two horizontal welds along the dimension "a". Design *C* is the same as *B* except that it eliminates the four horizontal, diagonal corner welds of *A* and *B* by substituting the four square corner pieces with double welds along dimension "c".

Offhand it would seem that the first design is the most desirable, since this would seem to be the easiest to fabricate. The truth or falsity of this conclusion rests in dimension "b". There are two determining factors: material cost and die cost. For any particular value of "b" these two factors regulate the choice of the design.

In blanking out design *A* from a square sheet of size  $a+b+c$  there is a certain amount of waste material discarded at each corner. The area of the waste sheet metal, increasing roughly at four times the square of dimension "b", soon grows to objectionable proportions. Since this waste can be used but infrequently for other purposes, it is the practice of the majority of sheet metal workers to change from design *A* to *C* where the saving in material exceeds the cost of additional welding and finishing, other factors being equal. Design *B* is seldom used because it would, to an extent, defeat the purpose of the change from *A* to *C*.

The second determining factor, die cost, influences the above mentioned change over in design, as the dimension "b" increases, often before the cost balance is actually reached. After the sheet is blanked out, it is placed in the brake and, in the case of design *A*, the four edges of dimension "c" are first formed and then two of the sides of dimension "b", which are opposite each other, are formed. The last forming operation is on the remaining two opposite sides, and it becomes apparent that the distance between the lower die and the upper face of the brake or, in other words, the height of the upper die, must provide clearance for dimension "b". In most cases, this condition limits the selection of design *A* to a 2 in. to 4 in. maximum for dimension "b", regardless of the waste factor. Dies of greater height would be prohibitive in cost. At times, extensions are attached to the upper die to permit the use of design *A* with deeper boxes, but from the standpoint of strength and service life these are not very satisfactory.

These considerations apply particularly to mass production of boxes or other sheet metal equipment of similar design. Where the production is spasmodic or where a variety of sizes is included, appreciable savings can be realized by joining sizable pieces of scrap metal, by welding, to make up a sheet sufficiently large for

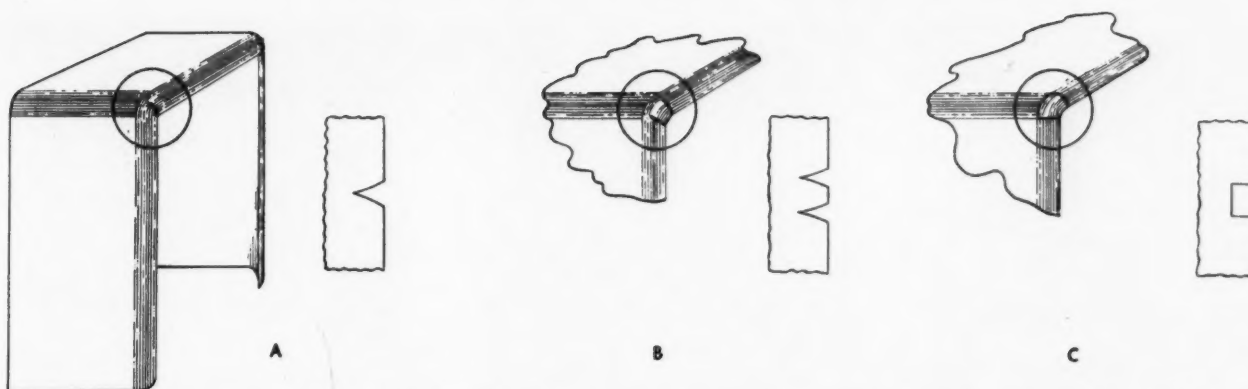


Fig. 4—These sketches show three methods for forming round or rolled corners by welding. Sketches A and B show single and double cuts to remove wrinkles in forming. The cuts are later welded. Sketch C shows a corner inset for use in heavy plate where wrinkling is impossible to avoid.

the blanking out operation. Many times this can be done with very little additional welding, and, as previously pointed out, the welds will not be discernible after being ground. Of similar nature would be the case where the box is so large that a sheet of sufficient size cannot be obtained, even for design C. In this event welding would be the only solution.

#### Designing Round Corners

A second example of how welding simplifies design is illustrated in the fabrication of round corners for sheet metal equipment such as domestic refrigerator casings. Fig. 3 emphasizes how welding—and very little of it—greatly simplifies the problem of satisfactorily forming a shape of this type, while Fig. 4 depicts the development of this corner design.

It is conceivable that the casing illustrated in Fig. 4 could be formed from a single sheet without welding. This procedure, however, because of the rounded corners, represents a very difficult forming operation that cannot be considered practicable for the following reasons: (1) the equipment necessary to handle the forming operation would be massive and would be prohibitive in cost; (2) forceful shaping of the casing from a single sheet would cause the metal to upset in the form of wrinkles at the rounded corners (the removal of the wrinkles by grinding, while satisfactory from the standpoint of appearance, would weaken the casing); and (3) the edge of the casing would become irregular, particularly at the corners, and a trimming operation entailing additional labor would be necessitated. To overcome these disadvantages, the usual practice is to use welding, as shown in Fig. 4. Simple forming operations will handle this job if the corner weld is introduced.

The malleability of the sheet, the method of forming, the thickness of the sheet, and the radius of curvature of the corner determine the particular corner design most advisable. Forming may be done through the agency of a die, or a hammer and a shaped block. The latter is a flexible procedure that facilitates shaping without wrinkle formation. Depending upon the skill with which the corner is shaped, it may be satisfactory to use a single weld on corners that would require a double weld if the corners were pressed into shape with a die. In quantity production, corners are usually pressed because of the comparatively high cost of manual shaping. With an inadequate corner design, the

pressing operation would cause the formation of wrinkles, which would prove more and more troublesome as the sheet thickness and the radius of curvature increase. This condition influences the change from a single to a double weld or, if wrinkle formation persists, to a corner inset as shown in the third sketch. Although the corner inset would involve a little more welding, the additional welding cost would be far outweighed by improved quality and by other savings.

#### Shaping Sheets by Stack-Cutting

In connection with the quantity production of sheet metal products, mention should be made here of the

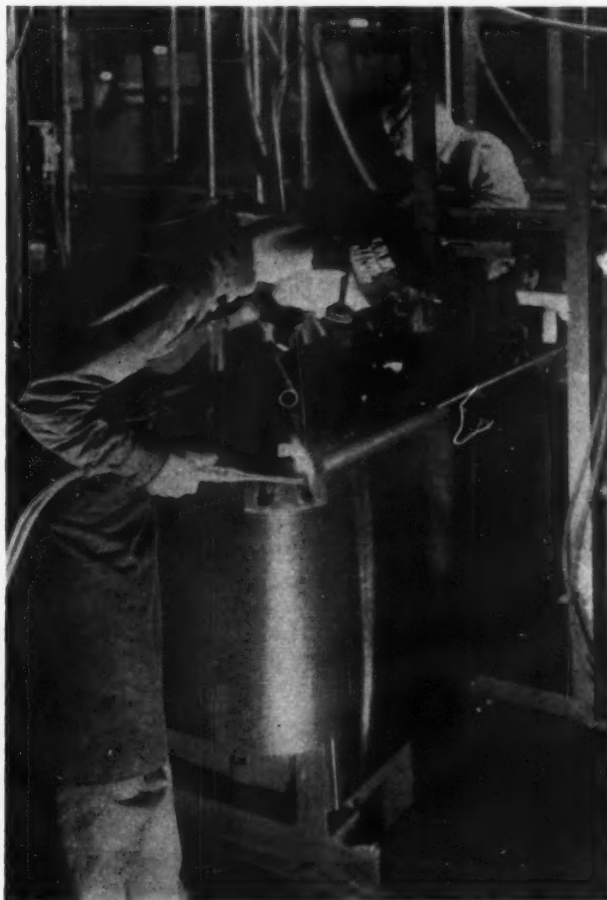


Fig. 3—Welding the turned edge (large radius) of a refrigerator casing. In this type of fabrication, a small amount of welding can save an elaborate and costly die-forming set-up.



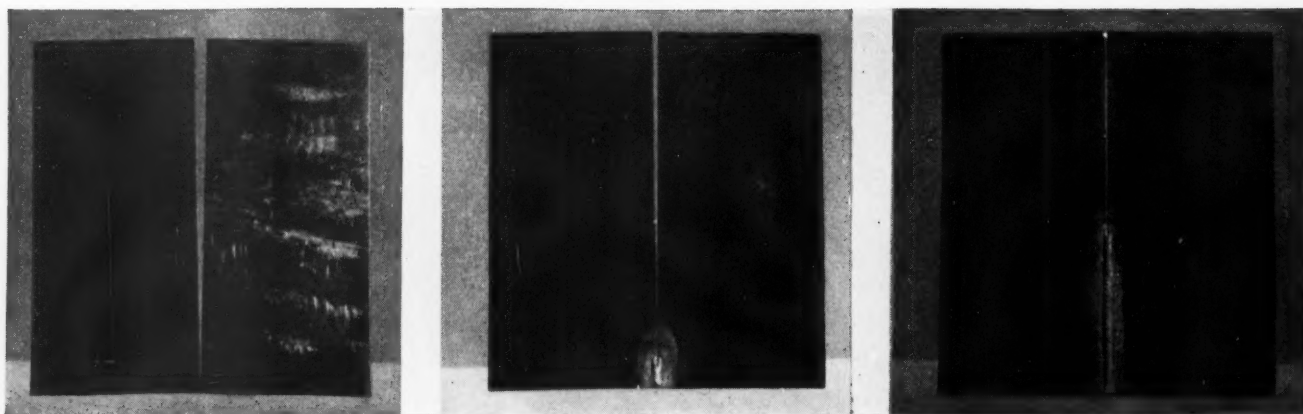


Fig. 6—In butt welding, the sheets spread slightly as welding progresses because of initial expansion and will later, as contraction sets in, draw together. The welder must know how to approximate the opening and closing of the seam so that edges will come together evenly.

stack-cutting process for shaping sheets preparatory to welding. By means of this process, a number of sheets are piled one on top of another, clamped tightly together, and then oxy-acetylene machine-cut as though they were one solid piece of metal. Stack-cutting has been used successfully for cutting sheets as thin as 26-gauge 100 at a time, while a typical production job consists of cutting 24 sheets of 16-gauge material. Sheets as large as 10 ft. by 30 ft. have been handled without difficulty.

Stack-cutting has a number of advantages over other forming methods. Of particular value is its flexibility. Irregularly shaped parts are readily cut with very little time required for setting up the equipment. When sheets are cut in stacks, every piece is identical in contour and this contour can be duplicated over and over. Also, the edges of oxy-acetylene cut sheets are square and full with no burrs or slivers such as are often present on sheets prefabricated by shearing methods.

#### Controlling Expansion and Contraction

In planning sheet metal welding operations one of the most important problems to be considered is the control of expansion and contraction. The heat applied during welding will be partially conducted into the sheet, causing expansion and, upon cooling, contraction in the proximity of the weld. The forces of expansion and contraction do not wholly compensate for each other. Since the heat applied in welding, which takes place progressively, is unevenly distributed along the length of the seam, the expansion and shrinkage stresses developed will not be uniformly distributed. Moreover, internal stresses, set up by mechanical working of one sort or another, may be locked up in the sheet and, if present, these stresses will interfere with the normal counteracting tendency of expansion and contraction. The thermal stress developed by expansion may be sufficiently great to cause permanent deformation in the sheet, and this condition is usually beyond complete reparation by contraction. Therefore, it is necessary that these forces be controlled.

It is apparent that distortion and buckling can be minimized by limiting the heat input. This can be accomplished by actually welding with less heat or by using jigs that will rapidly draw heat from the sheet. A good welding operator will make a satisfactory weld

with the minimum amount of heat input. In this connection, bronze-welding, which entails the use of considerably less heat than would be the case with fusion welding, can, at times, be used to advantage. Water-cooled jigs, solid jigs of massive structure, and jigs with copper insets have all proved effective for ridding the sheet of heat through conduction into the jigs. While efforts to limit or dissipate the heat input will alleviate to an appreciable extent the tendency to distort or buckle, complete control of expansion and contraction can be realized by making proper allowance for the movement of sheet metal members during welding, by restricting this movement, or by more evenly distributing the heat input over the full length of the seam.

#### Spacing the Edges

As welding progresses along straight seams the two edges of the sheet metal members will, through initial expansion, spread slightly apart for the first few inches of the weld and will then, as contraction sets in, draw together slowly. Unless this movement is controlled or unless proper allowance for the movement has been made, the two edges will overlap before the weld is finished. Where two sheets are to be joined in the same plane, it is common practice to make this allowance as shown in Fig. 6.

The experienced welding operator will be able to approximate the required spacing so that the edges will come together evenly at the end of the weld. The space allowance will vary directly with the thickness of the sheet and also with the length of the seam. A good rule-of-thumb is to allow a spacing equal to the thickness of the sheet for every foot of weld length. To some extent, incorrect spacing can be remedied as the work progresses by controlling the speed of welding and, in consequence, the heat input. By welding as rapidly as good welding will permit the heat input, the sheet movement, and the space allowance are held to a minimum.

#### Restricting Sheet Movement

Where the two sheet metal members to be joined are not in the same plane it may be difficult to make allowance for expansion and contraction. In this event, the edges should be aligned parallel, and various means

*(Continued on page 76)*



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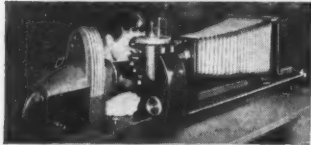
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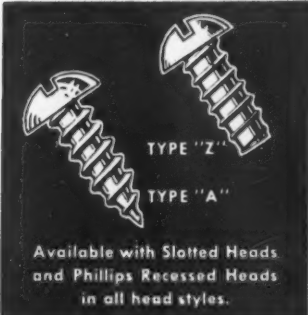
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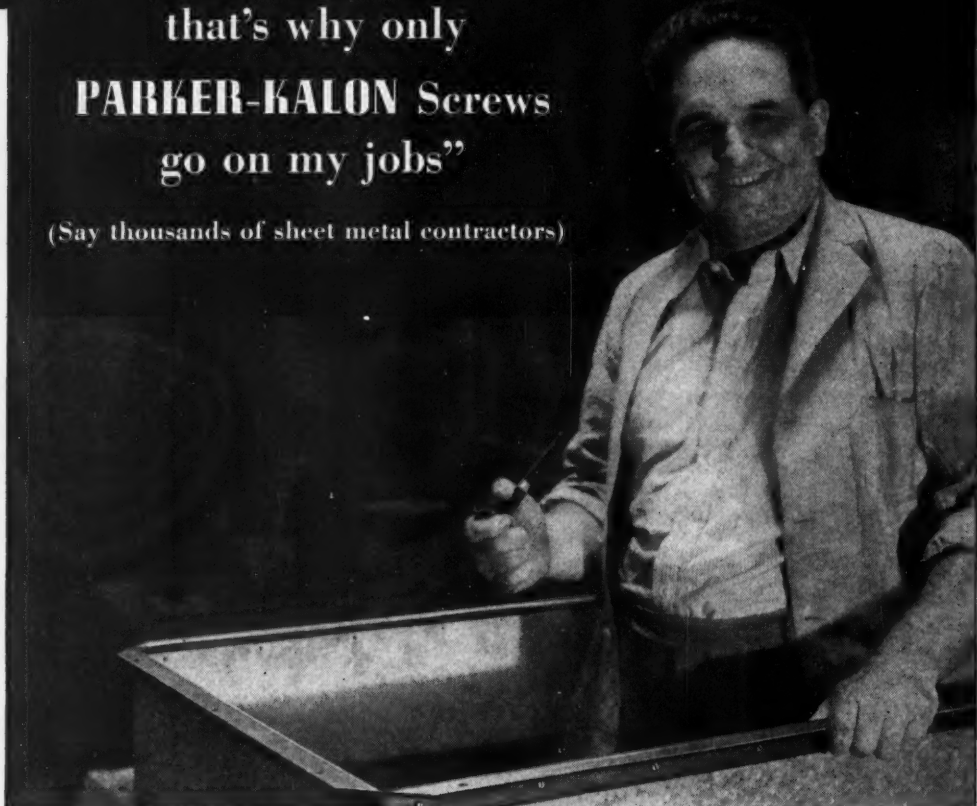


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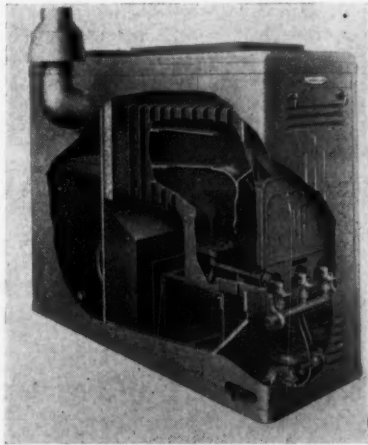
● Indicates product not listed in 1939 Directory.

△ Indicates product and manufacturer not listed in 1939 Directory.

# NEW PRODUCTS

## 109—Improved Conditioners

The Henry Furnace & Foundry Company, 3473 E. 49th St., Cleveland, announces new improvements and developments in its line of gas-fired winter air conditioners. The Aristocrat has been redesigned, finished in smooth gray enamel with large access

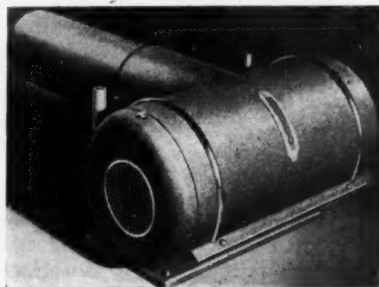


doors in all four sides. All controls and other devices are accessible at the front and the heating cabinet has a metal floor so that the casing becomes an air-tight, dust-tight compartment. Equipped with a two-speed blower.

The Special is similar in construction to the Aristocrat, finished in dark buff enamel and is equipped with one-speed blower and is of somewhat smaller dimensions.

## ●110—Conco Oil Burner

Conco-Sampsel Stoker Corporation, Mendota, Illinois, announces a new conversion oil burner in two sizes



and types to cover installation ranging from the small residential to the large apartment. Both units are finished in blueslate gray baked Wrinklelac, trimmed in chromium.

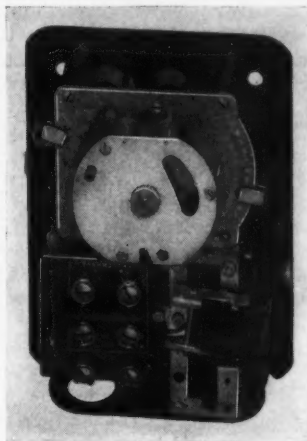
## 111—Relays

Minneapolis-Honeywell Regulator Company, 2950 Fourth Avenue, South, Minneapolis — Pneumatic Division—announces an improved line of relays for use in pneumatic temperature control systems.

Type R046A electric-pneumatic relay is for application to central fan and similar systems; Type R047A electric pneumatic relay is intended for application to unit ventilators or small central fan ventilating or air conditioning systems; Type R048A is a new diverting relay, air operated, to divert a source of air into either of two outlets; and Type R095A Grad-U-Relay is a new graduate type relay which transmits the control pressure in the air line leading to it from a thermostat to a greater number of control motors or valves than the controlling device itself can operate.

## 112—Stok-A-Timer

The Mercoid Corporation, 4201 Belmont Avenue, Chicago, announces a new Type THV Stok-A-Timer for maintaining the stoker fire during the



period when the thermostat does not call for heat. The heat motor operates a gearless mechanism having one rotating member that turns at the rate of one revolution per hour.

Electrical capacity 10 amp. 115 volts, 5 amp. 230 volts. Motor rating 1 hp. Repulsion-Induction, 1/2 hp. Split-Phase.

## △113—The Furnace Master

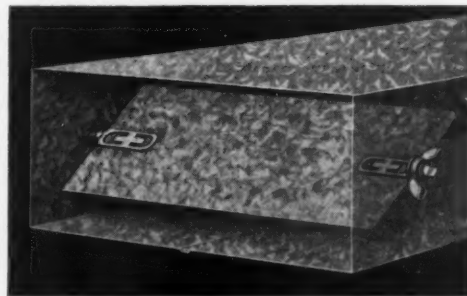
The Forker Corporation, 4614 Prospect Avenue, Cleveland, is distributing a leaflet describing the Furnace Master, an automatic heat attachment consisting of a small blower that attaches

to the ash-pit door. The blower starts and stops by impetus of a living room thermostat. The Stack-stat is installed on the smoke pipe to automatically check the fire. The standard package includes blower with mounting plate, junction box and switch, and Stackstat thermostat with receptacle, cable, etc.

## △114—E-Z-On Damper Regulator

M. A. Gerett Co., Milwaukee, Wisconsin, has placed on the market a new type of damper regulator—the E-Z-On damper control.

The damper regulator is made of

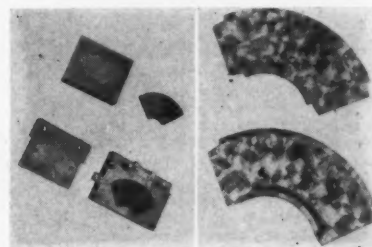


cold rolled steel and heavily coated with cadmium.

The company offers a free set to any tinsmith or supply jobber.

## 115—Duct Fittings

The Whitney Metal Tool Company, of Rockford, Illinois, has devised a method of producing elbow cheeks for duct fittings used in air conditioning and warm air heating work. Two spe-



cial sets of punches and dies; one for blanking and one for forming, are furnished with a standard No. 58 Foot Press.

The blanking die cuts the piece out of the flat sheet and the forming die turns up both flanges on the curves in one operation.

Also, the company is introducing a V-Die unit for the No. 58 foot press to form straight 90 deg. flanges up to 7 in. long in a pressing operation.

# New Products . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 98.

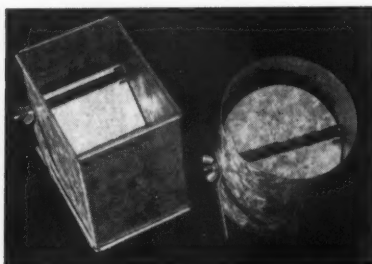


The outside, square, jacket is finished in green "silversheen" baked enamel.

## △119—Minute Damper Regulator

Joal Manufacturing Corporation, 2058 Canton St., Toledo, announces the new Minute damper regulator.

A feature is the use of a square-



sided bolt as an axis that fits snugly on clips at each side of the damper plate, the bolt fitting in a V groove in the damper plate so that the axis is properly centered.

## 120—G-500 A. C. Unit

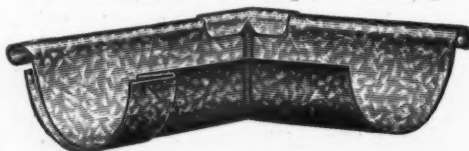
St. Louis Furnace Mfg. Co., 2901 Elliot Ave., St. Louis, announce their new G-500 series hand-fired, air conditioner unit. Drums and radiators are fabricated of heavy boiler plate steel, electrically welded throughout, new one piece heavy steel front, with cast iron doors and frames. Fronts are welded to the drums, eliminating gasket or cement joints.

The new square casings for these units need no bolts, nuts or sheet metal screws in erection. Inner liners are an integral part of outer casing panels. Bolts or sheet metal screws for fastening the casings to the fronts have been replaced by a new leak proof connection. Casings are finished in a heat resisting baked wrinkle enamel. Matched blower filter units also incorporate these features.

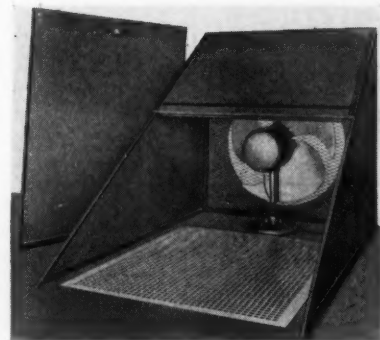
This new line of equipment is available in a variety of sizes. Gravity models are also available.

## 121—Eaves Trough Mitre

Milcor Steel Company, Milwaukee, announces a new eaves trough mitre with hemmed inner edge, extra long



wings and corner reinforcing cap. The mitre is made from two pieces of material, held together by a water-tight double seam. An extra heavy galvanized coating is applied.



## 122—Ilgwind Fans

Ilg Electric Ventilating Co., 2850 N. Crawford Avenue, Chicago, announces two new types of fans for cooling and ventilating a house through the attic.

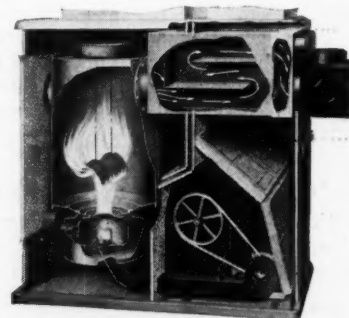
The regular type Ilgwind fan—mounted on an adjustable pedestal and requiring no installation—is placed in front of an open attic or hall window and connected by 20 feet of rubber covered cord to an electrical outlet.

The Southern type Ilgwind consists of the Ilgwind fan mounted on a short stem and housed in a special Ilg (or locally built) suction box for use in attics when the construction is very open and fan must draw directly from the floor below. The suction box is furnished complete with grille; automatic fire switch is available.

Capacities vary from 3080 to 7600 cfm.

## 123—3-Stage Oil Conditioners

Perfection Stove Co., 7609 Platt Ave., Cleveland, announces a new three-stage system of automatic control with a "miser feeder" pilot fire as the feature of the 1939 line of Superflex oil-burning air conditioning fur-



naces in three sizes (85,000 to 150,000 Btu at registers). This new patented device employs a dipping method of supplying oil for the pilot fire. It dips oil from a small well in the constant level valve, a spoonful at a time.

Synchronized blower control keeps the air-circulating blower operating in proportion to the fire by using a two-speed blower.

The furnaces have 20-gauge outer casings and are finished in orange-red and black enamel, chromium trim; or plain black baked enamel finish.

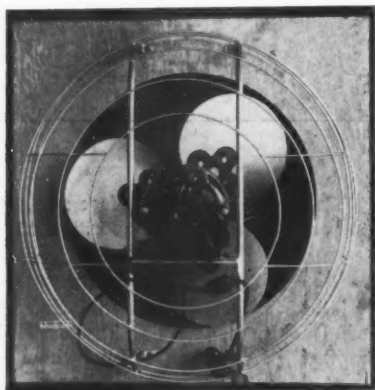
Electric control panels are factory wired, with summer-winter switches.

## ●116—Draftender

Penn Electric Switch Co., Goshen, Indiana, announces their new Type 910 Draftender damper motor, for hand-fired central heating plants, designed to give short and frequent opening of drafts. The damper motor is designed to be used with the standard Penn Temtrol (heat anticipating thermostat). The assembly is housed in a cast aluminum alloy case to seal in lubrication and seal out dirt.

## ▲117—Hi-Point Cooling Unit

The Forker Corporation, 4614 Prospect Ave., Cleveland, is producing the new Hi-Point home cooling unit to be



hung in the attic window, or used in a bedroom or hall window, or hung in the kitchen window to exhaust cooking odors, or used in the basement to dry clothes on rainy days.

## 118—Oil-Fired Heat Wave

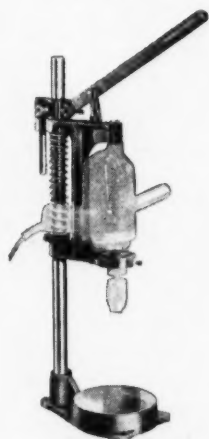
The Farquhar Furnace Company, Wilmington, Ohio, announces the new Heat Wave automatic oil furnace in four sizes—85,000, 115,000, 140,000 and 170,000 Btu output per hour at the register. Equipment includes the Farquhar Heat Wave oil burner unit, filters, blower and controls (limit control, blower control, protectorelay and chimney draft control).

The counter-flow principle is employed with the radiator ahead of the blower. The furnace body is full height, round topped; the combustion chamber is stainless steel with reflecting surfaces. Blower capacity is 1,250 to 2,500 cfm.



# New Products . . . . .

For your convenience in obtaining information regarding these items, use coupon on page 98.



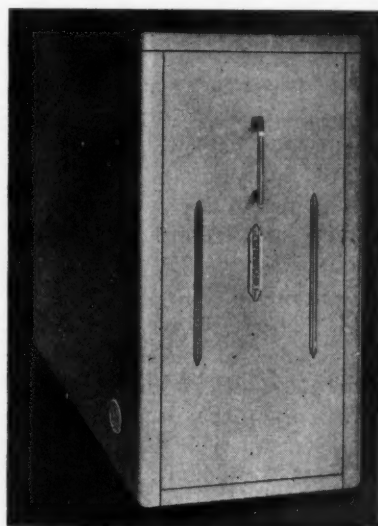
## 124—1/2-Inch Drill

Speedway Manufacturing Company, 1834 South 52nd Avenue, Cicero, Illinois, announces a new standard 1/2-inch industrial drill.

The "89" is finished in two-tone blue crackle and lacquered white metal, and weighs 9 1/2 pounds. This new design is gripped crossways instead of in pistol fashion.

## 125—Oil-Fired Airconditioner

The Conco-Sampsel Stoker Corporation, Mendota, Illinois, is introducing an oil-fired air conditioning unit, in two models finished in Blueslate gray baked Wrinklelac, and trimmed in chromium.



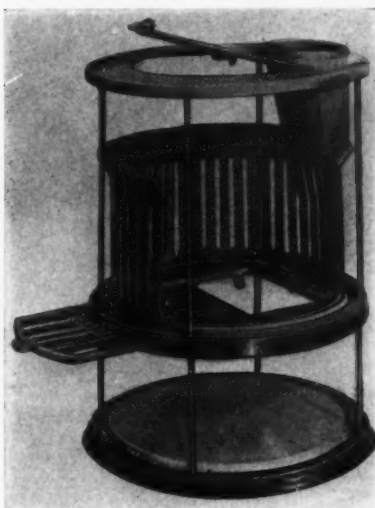
Features include filters, pan type humidifier with automatic water level, Magic Hand control and a field draft control for automatic regulation of chimney draft; a quiet low-speed fan and long hour motor.

The "Magic Spray Regulator" is a turbine-type air feed which directs air in a swirling, rotary motion into a cone-shaped flame.

## 126—Incinerator

The Majestic Company, Huntington, Indiana, announces a new low-cost home incinerator—No. 30—to consume wet or dry garbage and burnable rubbish—24 inches in diameter and less than 3 feet in height—with a capacity of three bushels of waste material. The unit connects to any furnace flue.

A draw grate can be pulled out to

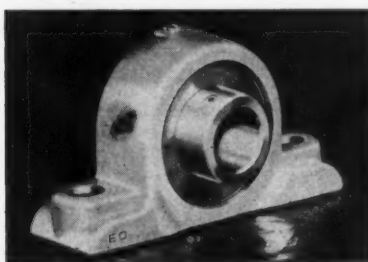


allow ashes and unburnable material to drop into the ashpit. Space is provided for ashes. The shell is of steel, finished in heat-proof aluminum and trimmed in black. Top, liner, grates and bottom plate are of heat-proof cast semi-steel.

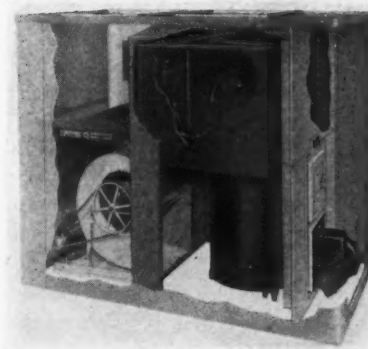
Another model, the No. 3 Majestic incinerator, is designed for use where only dry refuse is to be burned.

## 127—Inexpensive Pillow Blocks

Ahlberg Bearing Company, 3025 W. 47th St., Chicago, has put into production a new series of inexpensive, light-duty ball bearing pillow blocks, catalogued as "Series ED."



"ED" pillow blocks consist of a specially designed Ahlberg single row bearing in a die-cut housing, assembled to provide for shaft deflection and misalignment up to 1 deg. Seals made of Neoprene, are of a floating construction. Standard shaft sizes are 1/2, 3/4, 1, 1 1/4 and 1 3/4 inches.



## 128—XA-200 Air Conditioner

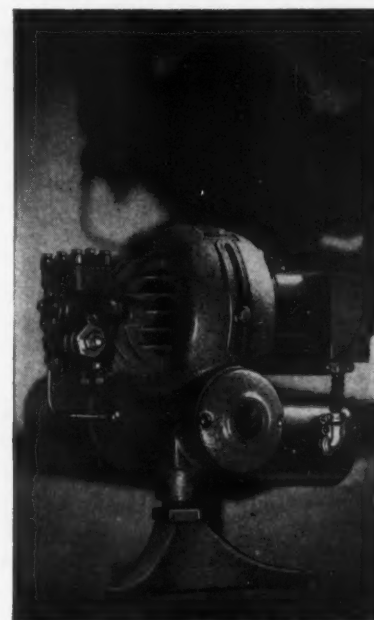
Round Oak Co., Dowagiac, Michigan, announces the XA-200 winter air conditioner—a complete oil furnace and winter air conditioner for large homes and a companion model to the X-80 and the XA-100. The XA-200 produces 147,000 Btu per hour at the hood and provides heat for 8, 9 and 10-room houses.

The steel furnace designed for the burning of oil, is fed by the Round Oak Contraflow oil burner. Other regular equipment includes spun glass filters, multi-blade blower, automatic humidifier and controls. The blower assembly is mounted on a sound isolation pad.

Control equipment consists of a heat-anticipating thermostat, combination blower switch and high limit control, and combustion safety control for intermittent ignition.

## 129—Two Oil Burners

The Nu-Way Corporation of Rock Island, Illinois, announces two new oil burners—Model XL-2 with a range of one to two gallons per hour and Model XL-6 with a range of 2 to 6 gallons of oil per hour.



The XL-2 can be furnished with either flange or floor mounting. Both burners have a window for observing flame during operation and smooth baked enamel finish is used.



## Dingle's Movable Line

(Continued from page 30)

Keen competition for what little business was available apparently led to price cutting, as is borne out by the fact that in 1930 our shop man gave his customers 60.75 cents worth of material and direct labor for each dollar of sales price, as compared to 56 cents in 1929. There was an increase of 6.25 cents in the overhead content of a sales dollar and a net decrease in profit of 11 cents. Overhead crowded the "movable line" over into the profit area.

Looking now at 1931, (Fig. 12) where sales volume continued its decrease, and overhead costs were reduced almost five hundred dollars, we see a new condition. Prices evidently stiffened, as is evidenced by the reduced material and direct labor costs in the sales dollar. But look at what happened to Overhead. We now summarize the three years, thus:

	1929	1930	1931
Material .....	35.50	37.25	28.50
Direct Labor .....	20.50	23.50	25.75
Prime Cost .....	56.00	60.75	54.25
Overhead .....	24.00	30.25	45.75
Profit .....	20.00	9.00	....
Sales Dollar .....	100.00	100.00	100.00

During the years 1930 and 1931, the reduction in sales volume consumed the profits. In 1929, with a normal sales volume, our man made a fair profit (before compensation for his own services). Overhead costs were \$4,947.00 and his overhead in the sales dollar was 24%. In 1931, with overhead costs of only \$4,210.10, his overhead in the sales dollar was 45.75%, eliminating entirely his profit. As a matter of fact, he did have a profit of ten cents in each \$100.00 of sales—too small to show here.

As can readily be seen from these charts and the summary above, decreasing sales volume caused the "movable line" to completely eliminate profit. Overhead costs were reduced from \$4,947 to \$4,210, but Sales Volume dropped from \$21,399 to \$9,225.

### How Can We Control the "Movable Line"

To control this "Movable Line" it is necessary that you constantly watch two elements—Sales Volume and Overhead Expenses. These elements can only be watched and, in some measure, be controlled by adequate cost records. Of course, 1929, 1930 and 1931 were "depression years" and the conditions shown in this chart were rather abnormal. That is why we have used this particular shop and these years as an example. It may be your operations in these same years showed just as sharp a decrease, both in sales volume and in profits. Did you join in a price cutting orgy for what little business was available in 1930, and did you realize, in 1931 that such price cutting did not pay? Did you watch your overhead expenses and actually reduce them each year?

Our shop man made a fair wage and some return

on his capital in 1929, on a sales volume of \$21,399. In 1930, he did not earn a laborer's wage, to say nothing of a return on his capital. In 1931 he did not even have a fair week's wage for his year's work. His sales dollars were "square" but the "movable line" crowded out his profits.

Perhaps you are asking what this fellow could have done to avoid this loss of profits. First, let's admit he could not completely avoid the effect of the declining sales volume. We can admit, I believe, that he and his fellows in business could have avoided price cutting, and saved something in 1930. There was no good reason for giving the customer \$4.75 more material and direct labor in each \$100.00 of sales. That was corrected in 1931, when, instead of \$56.00, as was the 1929 figure, only \$54.25 was the 1931 figure.

How does 1939 stack up, as compared with 1938 in your business? Suppose you prepare a "Square Dollar" and each month see how the "movable line" hits you. If Overhead percentage climbs, it can but cut your profit.

## Konzo, Mechanical Cooling Units

(Continued from page 39)

should be adequately insulated to minimize heat gain.

- 3) An effective temperature somewhat higher than 73 deg. F. may be satisfactory for residence service, and in this case more conservative results for the cooling load can be obtained.
- 4) An indoor temperature of approximately 80 deg. F. with relative humidity below 55 per cent results in satisfactory comfort conditions in the living quarters of a residence. For complete comfort in sleeping quarters a somewhat lower temperature is desirable.
- 5) The introduction of approximately one air change per hour of outdoor air for the purpose of ventilation is sufficient to prevent objectionable odors.
- 6) A mechanical refrigeration unit capable of producing 2½ tons of refrigeration is sufficient to maintain conditions of comfort on two stories of a residence similar to the Research Residence when the outdoor temperature does not exceed 103 deg. F. and an amount of outdoor air equivalent to one air change per hour is used for the purpose of ventilation.
- 7) The cooling load during the daytime can be reduced by supplementing artificial cooling during the day with cooling by means of outdoor air circulated at night.

In the next issue a short discussion of water cooling systems and comparative operating costs of water cooling and mechanical refrigeration systems will be presented.

# Fully Equipped!



Do you remember the days, not so long ago, when the published price of an automobile included no spare tire, bumpers or other similiar items of equipment? Today, the cars come fully equipped because adding on the so-called "extras" was confusing to both dealer and purchaser alike.

In your business too, keeping track of the countless and constantly changing materials and equipment used by the trade can be confusing, take a lot of time and cost you real money. Instead, thousands of shop owners rely on the simple economical method of letting OSBORN keep them fully equipped.

Here at OSBORN, from one of the country's largest and most up-to-date stocks, you can obtain everything used in your work—quickly, at the right price and of dependable quality. Most of these items are described and priced in the OSBORN Book No. 39. May we send you a copy?

THE J. M. & L. A.  
**OSBORN Co**  
Manufacturers—Distributors  
**BUFFALO • CLEVELAND • DETROIT**  
Metals and Metal Products

A DEPENDABLE SOURCE OF SUPPLY FOR 80 YEARS

STEEL, IRON, STAINLESS,  
 ALUMINUM, COPPER, ZINC  
 AND PERFORATED SHEETS

TIN AND TERNE PLATE

TROUGH, GUTTER AND  
 CONDUCTOR PIPE

AIR CONDITIONING AND  
 WARM AIR FURNACES

REGISTERS

FURNACE PIPE  
 AND FITTINGS

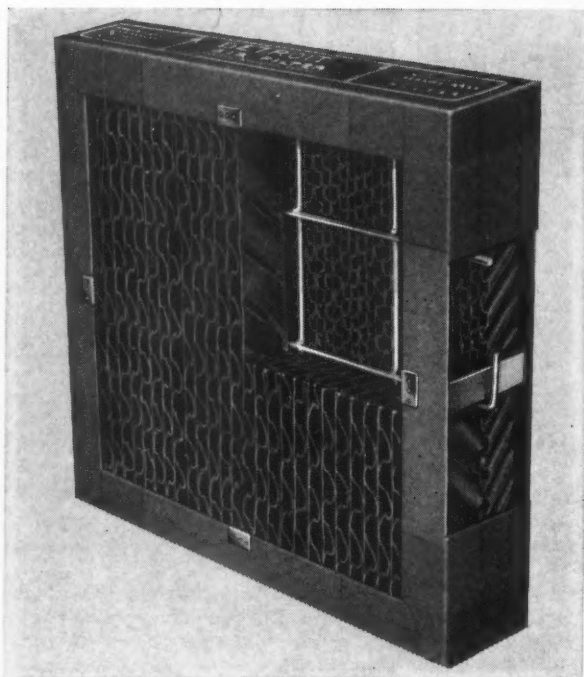
BLOWERS AND CONTROLS

ASBESTOS AND ASPHALT  
 ROOFING AND SIDING

TOOLS AND MACHINERY

# ANNOUNCING - - -

## THE DETROIT AIR FILTER



*Formerly the Arco Air Filter*

● In addition to new improvements the Detroit Air Filter retains all of the exclusive and unusual features of the Arco Air Filter under which name it was formerly sold.

Write for Bulletin No. 187

**DETROIT LUBRICATOR COMPANY**

General Offices: DETROIT, MICHIGAN

Canadian Representatives—RAILWAY AND ENGINEERING SPECIALTIES LIMITED  
Montreal • Toronto • Winnipeg



You're Passing Up  
A Real Bet  
If You Don't Act  
**NOW!**

# HESS

## OFFERS YOU A COMPLETE LINE AND EXCLUSIVE TERRITORY

Break down your customers' sales resistance by offering them America's finest welded steel furnaces . . . all sizes up to a million B.T.U. capacity. The Hess line includes blower filter units of unsurpassed quality and performance, also oil burners and stokers to fill every dealer requirement. You'll profit by doing business with responsible source of supply established since 1873.

# Free!

## Dealer Portfolio Complete Details and Sales Helps!

# HESS

## WARMING AND VENTILATING CO.

Established 1873

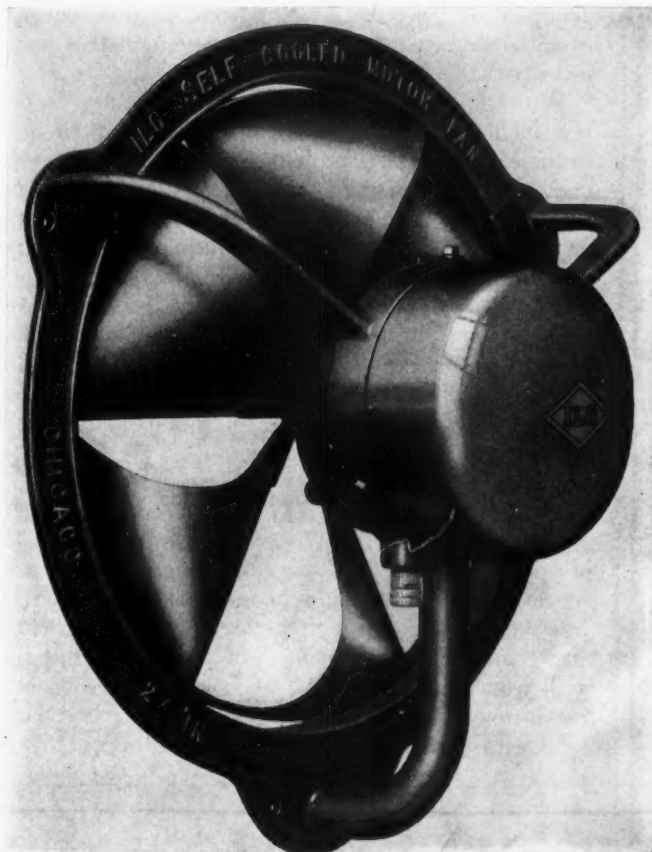
1211-27 S. WESTERN AVE.  
CHICAGO, ILL.

### HESS WELDED STEEL FURNACE

An extraordinary furnace; rectangular throughout; firebox lined with 2½" refractory; double casings and many other advantages offering greater efficiency, cleanliness, durability and economy.



# WHEN THE FANS ARE ILG AIR GOES TO WORK



BUILT BY ILG ELECTRIC VENTILATING CO.

Little things go a long way toward checking WEAR on the motor of this ILG self-cooled motor propeller ventilating fan . . . little things like SKF Bearings.

When SKF Bearings went on this fan, they assured the accuracy, balance and smooth-running characteristics that have made the letters "SKF" synonymous with "quiet, efficient, and smooth operation."

Radial and thrust load carriers, their only requirement is infrequent lubrication. And *that*, in terms of operating costs, amounts to something at the end of the year. WEAR is everywhere, but never beyond the reach of SKF.

SKF INDUSTRIES, INC., PHILADELPHIA, PA.  
4368

## THE BEARINGS ARE SKF

BALL & ROLLER  
BEARINGS



## Sheet Metal Welding

(Continued from page 66)

taken to restrict the movement of the sheet. One method would be to tack-weld or clamp together the edges of the seam at selected intervals. However, this method may be unsatisfactory since, if the metal cannot expand or shrink in the plane of either member, it will move under stress in a lateral direction, resulting in bulges or extensive buckling. This is caused by the opposition offered by relatively cool sections of the sheet to the stretch, on the part of the hot sections, for additional space. In this case the hot sections deform under compression. On the other hand, relatively cool sections also may deform under compression because of the resistance offered by the cool sections to the shrinkage stresses developed in adjoining sections during cooling.

The problem then presents itself of welding, with no lateral deformation, a seam with the two edges fixed in a parallel position. The obvious course would be to use jigs that will restrict movement in the one plane and, at the same time, buckling in the normal plane. Properly designed jigs will fulfill this double purpose by forcing the weld metal to absorb the expansion and contraction caused by welding. However, even with the use of proper jigs, these counteracting forces may not be fully confined to and absorbed by the weld, in which case a stressed condition may develop in the sheet which will be held in check as long as the jig is in place but which will cause deformation in the form of buck-

ling as soon as the jig is removed. This condition is most likely to develop where the seam is long or where the two metal members are in the same plane.

### Stagger Welding

A method often employed to relieve the buckling tendency is the so-called stagger welding procedure, the essential feature of which is the even distribution of heat over the full length of the seam.

With this procedure the welding operator welds a few inches at the beginning of the seam, then moves to the center of the seam where a like section is welded, next to the end of the seam, and finally back to where the first weld ended, repeating the cycle until the weld is completed. By evenly distributing the heat input, the stagger method not only minimizes buckling (the weld will more readily and uniformly absorb the forces of expansion and contraction, which will tend to compensate for each other to a greater extent than before), but also overcomes any tendency toward cracking which may occur where the weld is continuous and the metal is red short or low in ductility.

### Combination Methods

At times it may be desirable to combine the making of space allowance and the restricting of movement of the metal members. This would hold true where the jig is bulky and, through its own weight and without any clamping arrangement, would regulate the speed with which the ends of the seam would draw together. Or it may be desirable to restrict the movement of local areas only, and to direct the distortion to areas

# LOCKFORMER 22

*Now as low as \$20.00 per month*

**EASY to OWN, EASY to PAY for**

This very liberal **LOCKFORMER EASY PAYMENT PLAN** is now available to all progressive sheet metal shops. A few hours use each week actually saves more shop-labor costs than the whole monthly payment.

Take advantage of this offer, cut shopcosts, increase profits—with modern, efficient, low cost **LOCKFORMER** equipment. With this plan it is within the means of any shop regardless of size.

Your jobber or supply dealer has full particulars and will cooperate with you regarding this easy way of getting a **LOCKFORMER 22** or the new heavy duty **LOCKFORMER 18**. See him or write

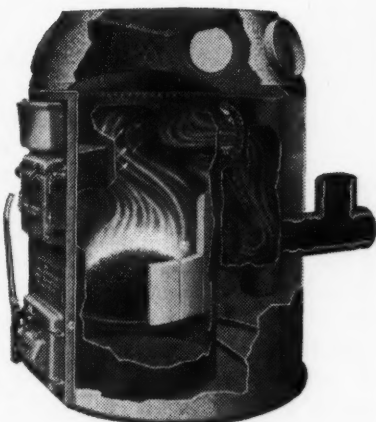
**The Lockformer Company**

4632 Flournoy St.  
CHICAGO, ILL.



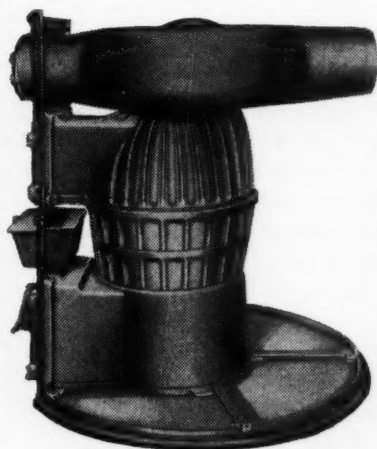
**DEPENDABLE  
DEPENDABLE**

Dependable service—competent engineering—dealer help—are only a few of the many advantages enjoyed by present "HOME COMFORT" dealers. This, together with a very complete line of Heating and Air Conditioning equipment for all types of fuel, in every price class, gives a "HOME COMFORT" dealer an opportunity to compete on every job. Many, many thousands of



1000 Series  
Steel

## "HOME COMFORT"



Dur-A-Ble — Cast Iron

furnace installations throughout the United States are ample testimony of consumer acceptance and satisfaction. Don't be caught short with an incomplete line to meet the requirements of the replacement market during the next few months.

*Write for details of our exclusive dealer franchise agreement.*

**ST. LOUIS FURNACE MFG. CO.**

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## THERMOSTATIC CONTROLS *Must be Dependable*

Thermostatic controls depend on their thermal responsive element for accuracy of operation—once calibrated, these controls must always respond to temperature changes in the same manner—year after year for the life of the product it is intended to control; there must be no let up.

Even the slightest shift or variation from its original calibration may seriously impair the service of the product which the control operates and thereby very decidedly handicap the manufacturer's future sales efforts. A few cents saved in the first cost by using a control element of questionable uniformity is to be "penny-wise and pound-foolish," it may mean the difference between success and failure for the manufacturer of the control and the product which the thermostat controls.

Chace High Temperature Thermostatic Bimetals are dependable, they will not "creep," they cannot leak, they offer service-free uniformity of operation even at excessive temperatures—year in and year out—Chace High Temperature Thermostatic Bimetals outlast the product which they control.

Specify Chace High Temperature Thermostatic Bimetals as the control element for your product.

**W.M.CHACE CO.**

1601 Beard Ave., DETROIT, MICHIGAN





Randall One-Piece  
Steel Housing  
Pillow Block

**Your customers benefit when  
you use**

## *Randall* pillow blocks

- Quiet
- Durable
- Low-Priced
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- Large Oil Capacity

### **A third of a century of bearing engineering**

Write for catalog describing the complete Randall line of pillow blocks.

Also manufacturers of Graphite Bronze Bushings in all sizes.

#### **Representatives carrying stocks**

TEK BEARING CO.  
177 Lafayette  
New York City

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C. W. MARWEDEL  
San Francisco  
California

**Randall GRAPHITE PRODUCTS CORP.**  
Dept. 711 609 W. Lake St., Chicago, Ill.

where it would not be objectionable. This partial restriction would be acceptable in the case of a curved duct with flanges at either end. Jigs would be used to hold the flanges in place and the distortion would be directed into the body of the duct.

Beading is often employed as a means of allowing for expansion and contraction in light sheet. Before the parts are aligned for welding, a bead (corrugation) is run along the sheet parallel to the seam and not more than an inch from the edge. The bead acts as an expansion joint, taking up movement that occurs due to the heat of the operation.

#### **Bulges and Buckling**

Bulges can, at times, be satisfactorily removed from ductile sheet metal through cold working with a hammer and block or through spot heating with the oxy-acetylene blowpipe. It becomes exceedingly difficult and often impossible to remove extensive buckling or distortion where ductility is low. This is particularly true in the case of a long seam that joins two flat sheets in the same plane. It is generally advisable to locate the weld at or near a square or rounded corner, if possible. Although a corner weld may not decrease the magnitude of the stresses developed, it will restrain the tendency of these stresses to cause buckling. The two sheet metal members, being in different planes, will each act as stiffeners and by this means oppose deformation in the other plane.

[Part 2 will follow]

### **Kruckman's Washington Letter**

(Continued from page 31)

\$70,000,000 on vocational training in public schools the coming year, has particularly emphasized the need of training skilled workers in the art of "transmitting what they know."

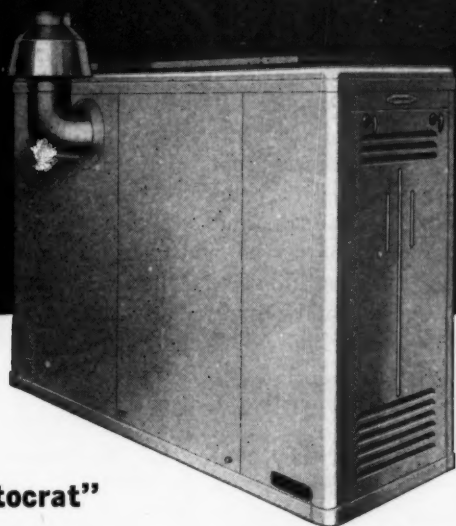
A general statistical survey of skilled labor as related to national defense has been launched by the Assistant Secretary of War. The best information available here is that approximately 35% of the union workers in the metal trades are either totally or partially unemployed. It is estimated that more than 40% of all sheet metal workers, including non-union men, are unemployed.

The Army regards sheet metal working as one of the "critical" trades. "Critical" in the military sense means highly important and particular. Sheet metal workers are the armorers of the Air Corps; they make the dies; in aviation they work upon the wing and fuselage which are turned out by hand. They cut the patterns. They are employed in numbers at the Navy Yards and aboard the ships of the fleet.

The State and City and Federal Vocational Education directors urge the workers who are not satisfied with their jobs to get in touch with the Vocational Education director in their vicinity. He can put them in the way of work.

# MONCRIEF

*Gas-Fired* WINTER  
AIR CONDITIONERS



The  
"Aristocrat"

## PLUS VALUES FULLY MEET 1939 REQUIREMENTS

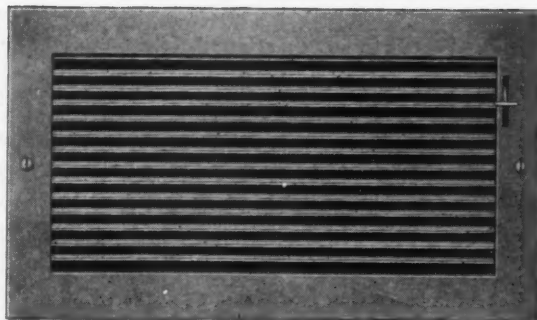
All that the most discriminating home owner can ask is afforded by the refinements in construction and the splendid finish of the "Aristocrat." Blower equipped with Two-Speed Motor produces a higher degree of comfort by improved air circulation. Controlled humidification, graduated to varying weather conditions, further contributes to increased comfort. Every device which in any way promotes convenience, comfort and economy has been included, making the "Aristocrat" truly a deluxe unit. Removable panels in all four sides make its interior fully accessible.

The "Special" has the same Moncrief high-efficiency burners and combustion drums, and all accessories to produce top-grade winter air conditioning. Single speed blower and automatic humidifier. Priced to interest the close buyer.

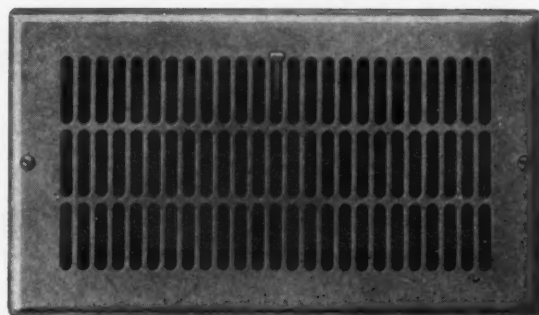
In addition, Moncrief offers the "BAC" Gas-Fired Winter Air Conditioner, still further favorably priced; and the "GG" Gravity Furnace.

*Write for new literature just off the press.*

**The HENRY FURNACE & FOUNDRY Co.**  
3473 East 49th Street • CLEVELAND, OHIO



"Fin-Flex"



"Classic"

## Fine Examples *of* REGISTER Design

It goes without saying that every Auer Register is built to yield full value in faultless, lasting service. For registers and grilles of uniform excellence in design, details of workmanship and finish—Auer is a dependable and *responsible* source of supply.

*Complete line of registers and intakes for warm air and air conditioning shown in Auer Book No. 39—sent on request.*

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3608 Payne Avenue Cleveland, O.

**AUER**  
**REGISTERS**  
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*For Air Conditioning and Gravity*

**now READY...Your Copy**

**PACIFIC**  
GAS APPLIANCE  
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**"THE LINE OF LEAST RESISTANCE"**

Pacific offers superior construction features...trouble-proof operation...longer life—in short, "Utmost Customer Satisfaction." Keep posted on all Pacific products and prices—a correct size and type for every heating and air conditioning problem. Mail the coupon NOW!

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...and still growing!

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Send complete literature and prices —  
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**FLOOR FURNACES**  
**FORCED AIR UNITS**

**Pacific**

**BASEMENT FURNACES**  
**UNIT HEATERS**

## Pennsylvania State Association

(Continued from page 34)

should condemn the weakness of our United States Department of Labor, and laws of our country detrimental to the deporting of all criminal aliens, together with others not in sympathy with our form of Government; that we should encourage and lend our support to all members of Congress and State legislature, who by their efforts are encouraging true Americanism.

The committee recommends the repeal of the undistributed profit tax, the capital stock tax, the income tax, and the social security tax on small corporations, insofar as by the nature of their work they compete with the individual or partnership, creating a burden on them to do business; and believes that the present laws are class legislation, unconstitutional and unjust, as stockholders, officers, and employees pay their tax and why should the tax be paid twice on the one creation? Small corporations, they believe, should be allowed to survive and permitted to function under the same laws as their individual and partnership competitors.

### Nominating Committee

The Convention then elected Ed. Reismeyer, Pittsburgh, and Sam Warren, Erie, to the nominating committee, and Pres. Sabathné appointed W. J. Keist, Pittsburgh, as a member, in accordance with the By-Laws.

### Codes and Licensing

Because of a serious illness in his family, W. C. Markle, past president National Association of Sheet Metal Contractors of the U. S., was unable to be present and State Secretary M. F. Liebermann of Ambridge spoke on "What an association can do for its members." Secretary Liebermann assured the convention that a strong state association could do much to eliminate so-called cut-throat competition; with all of the evils it established. He also cited the fact that a strong state association could and should curb all of the unethical practices, which had crept into the business structure of sheet metal contracting and warm air heating. Liebermann pointed out that Codes of Practice, which were functioning in many industries, were the net result of association activity and that the Standard Codes used in the warm air industry were possible only because of the National Warm Air Heating and Air Conditioning Association activity in sponsoring the Research Residence at the University of Illinois. The Book of Standard Practices in the Sheet Metal Industry was also the product of the collective thinking of association membership. The Workmen's Compensation premium reduction obtained in Pennsylvania was also the result of association membership and activity. When proper codes and licensing are enacted by the various municipalities, they too will be the net result of a real strong association membership.

### Steel—Man's Servant

C. Y. Hays of Carnegie-Illinois Steel Corporation projected the movie "Steel—Man's Servant" for the



**LOW COST  
LONG LIFE  
RELIABLE SERVICE**

**MASTER**  
TEMPERATURE CONTROLS

## TYPE B-22

A sturdily-built, trouble-free heat regulator that is noted among architects and builders for accuracy and dependability. Twenty years of constant effort have resulted in its outstanding efficiency. Master Heat Regulators respond to a temperature change of 1 degree. The perfect unit for any home. Low first cost, no maintenance expense and it will outlast the heating plant. Write for further information.



### NEW LOW PRICES

Write for Details

### SPECIAL CONTROLS

In addition to our standard line, we furnish quotations on regulators for special applications. We also manufacture the Type B-22-A and B-22-w limit controls. If you have any problem involving controls, write us for information.

### WHITE MFG. CO.

2362 University Ave.

St. Paul, Minn.

**ANNOUNCING**  
**A NEW ADDRESS**



*with newer and larger  
quarters to help us  
SERVE YOU BETTER*

Capitol Service has long been a byword with the trade, and now with the opening of the new store at 523 EAST WASHINGTON STREET, INDIANAPOLIS, INDIANA it becomes even more appropriate. Newer and larger quarters mean faster and better service on any of the following:

### STOVE, FURNACE and BOILER REPAIRS

### TO FIT ANY MAKE

DISTRIBUTORS of FURNACES

AIR CONDITIONING

HEATING and COOKING EQUIPMENT

TANK HEATERS • REGULATORS

PIPE and FITTINGS

**CAPITOL FURNACE & STOVE REPAIR CO.**  
523 East Washington St. Indianapolis, Ind.

# STOKER-OLA SALES MEAN PROFITS THAT DON'T "TURN RED"

No repeated service calls gnaw into anticipated profits—  
and reduce customer satisfaction. Profits "stay put."  
And another big advantage—

## STOKER-OLA IS EASIER TO SELL!

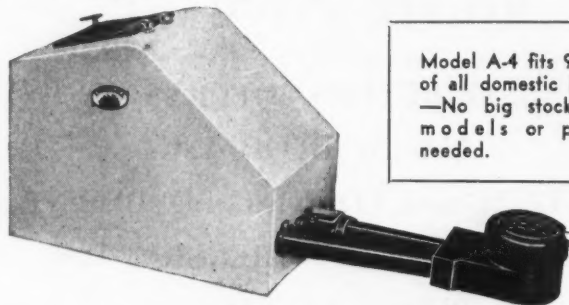


It has every fundamental of other stokers: Standardized  
controls, motor, conveyor, etc., plus eye-appeal—

*and, in addition, it offers that outstanding (and  
easily demonstrated) construction feature that  
appeals instantly to every prospect:*

## STOKER-OLA'S PATENTED GEARLESS DRIVE

without a single gear-wheel to wear out or make a noise!  
And, aside from meaning that "NO GEARS MEAN  
MORE YEARS" this remarkable feature offers unlimited  
coal-feed settings and it is the prime feature around which  
you present a most convincing sales argument that in-  
cludes these other features: (1) More Power; (2) Only Two  
Major Working Parts; (3) No Oil Changing and (4) A  
3-Year Guarantee!



Model A-4 fits 90%  
of all domestic jobs  
—No big stock of  
models or parts  
needed.

## AND, BEST OF ALL, IS STOKER-OLAS PRICE!

If you feel that the above features represent the stoker  
you want to sell, a request will bring you full details.

**ADVANCE APPLIANCE CO.**  
810 S. Washington St. Peoria, Ill.

convention, produced in Technicolor, with the narration  
by Edwin C. Hill, Radio Commentator.

### Evening Entertainment

In the evening, the Beaver County Association acted  
as hosts to the entire convention at a gala party at the  
Beaver Falls Turnverein. In addition to a sumptuous  
buffet supper and refreshments, they provided the  
finest of gymnastic entertainment by the winners of the  
National Turners Tournament. This team of nine men,  
all of whom are employed in Beaver Valley and who  
have gymnastics as a health hobby, delighted everyone  
present with their real skill and daring.

### Officers Re-elected

On Friday morning, June 16th, the first order of  
business was the report of the nominating committee,  
who recommended that the present officers be reelected.  
Because the report was unanimous, there were no  
nominations from the floor.

### Copper Roofing

Carter S. Cole, engineer, Copper & Brass Research  
Association, presented a very interesting paper on  
copper roofing, which was illustrated with lantern  
slides. By means of these slides Mr. Cole was able  
to show the right and wrong way of laying copper  
roofs. Because of differences of opinion on the part  
of some architects, Mr. Cole told the convention that  
the best procedure in applying copper roofs was to  
follow established procedure.

### Workmen's Compensation Fund

Edgar Neibert and G. G. Gunther of the State Work-  
men's Compensation Insurance Fund were presented  
to the convention and ably described the workings of  
the fund, and the reductions which are to be effected  
by the new rates for the industry. An open forum fol-  
lowed, and these gentlemen answered many questions  
from the floor, particularly those which have to do  
with the reporting of accidents to workmen in the  
classifications set up for the industry.

### Committee Reports

The Auditing Committee reported that the Treas-  
urer's report as submitted to the convention had been  
approved.

The report of the Nominating Committee was  
unanimously approved and all the incumbent officers  
elected for the ensuing year.

Pres.—A. J. Sabathné, Altoona  
1st V. P.—R. S. Hahn, Easton  
2nd V. P.—S. H. Meyers, New Kensington  
Sec'y—M. F. Liebermann, Ambridge  
Treas.—H. G. Hartline, Erie

### Contractors in Air Conditioning

R. H. Sommers, assistant general manager of The  
Lau Blower Company, addressed the convention on  
"Air Conditioning"—what he believes the sheet metal

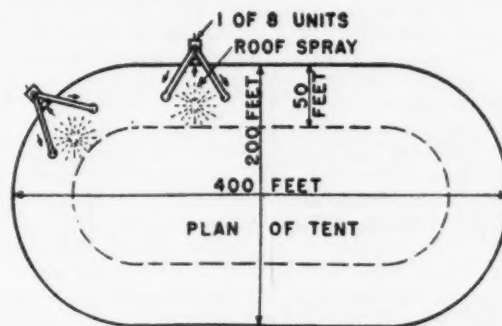
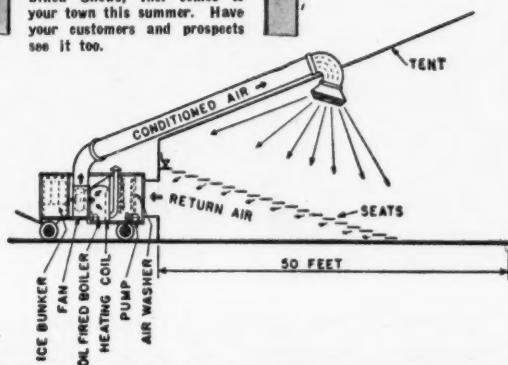
this unusual demonstration of comfort when the Ringling Bros.-Barnum & Bailey Combined Shows, Inc. comes to your town this summer. Have your customers and prospects see it too.

Eight complete sets of Buffalo equipment similar to that illustrated below have been furnished each mounted on a trailer truck. Through sixteen huge

## BUFFALO FORGE COMPANY

**Branch Engineering Offices in Principal Cities**  
**Canadian Blower & Forge Co., Ltd., Kitchener, Ont.**

If you want equipment to do the finest possible job year after year at lowest maintenance and operating cost, we invite you to take advantage of our 60 years of fan engineering experience.



## NIAGARA

## MACHINE & TOOL WORKS

**BUFFALO, N. Y.**

*Branches:*  
New York      Cleveland      Detroit



contractor must do to get and retain his proper place in the air conditioning field. He mentioned the rules and regulations of the industry, established as a result in large part of the activities of the National Warm Air Heating and Air Conditioning Association, and the wealth of information and data being accumulated following experiments at the Research Residence at the University of Illinois.

Three branches of work—heating, ventilating and air conditioning, covering both the industrial and domestic market—afford an unlimited field for the aggressive sheet metal contractor, he believes.

In order to get and retain a proper place in the air conditioning field, Mr. Sommers enumerates the following:

Select well-known high-quality merchandise to sell—for easier selling, fewer service calls and better satisfied customers.

Sell not only service but equipment.

Limit line to a few profitable items so that the contractor can concentrate time and efforts to do a good job.

Don't be a "chiseler." Keep accurate records and charge honest prices which are fair to the contractor and his customers.

Install carefully, cutting the possibilities of service calls to the minimum as every service call costs \$2.00 or \$3.00 at least. Troubles which do occur are most often traceable to the installation or improper operation and not to the equipment. In many cases trouble is also caused by over-selling a job. Too many times exaggerated claims have been made about certain pieces of equipment to the detriment of the industry as a whole, and Mr. Sommers warned to be careful and not over-sell equipment. The dealer, he said, owed it to his customer, the manufacturer and to himself to give hon-

est and reliable information and to check and double check every job so that the customer is satisfied.

Keep up with modern developments, for what is new today may be obsolete tomorrow. Especially, he said, is this true in the air conditioning field. This means spending a great deal of time in reading and studying on the latest types of equipment and method of installation. Probably the best way to do this, he said, is by reading your trade papers and magazines, literature sent out by the manufacturers and special books covering these subjects.

In summary, Mr. Sommers suggestions were to sell a few well-known high-class lines of equipment, charge fair prices, install work to the very best of ability and keep up to date.

#### Widening Market

Bennett S. Chapple, assistant to the president of The American Rolling Mill Co., gave an inspiring talk on the possibilities for the widening of the sheet metal market. He cited the advances made in the production of sheet steel, by the continuous rolling method and predicted the application of these advances throughout the entire warm air heating and sheet metal contracting fields. Mr. Chapple told the convention that the uses for sheet steel would widen in direct proportion to the selling efforts of the industries most interested and made a plea for better selling by the entire industry.

#### Overhead

Earl Davis and Louis Luckhardt of Pittsburgh gave a very interesting example of the proper figuring of overhead expense. It was found, in the cases studied

## No, it isn't this Easy!

**N**O, we don't claim that our dealers just sit at a desk all day long and take orders for our humidifiers—nor do we say that you'll be able to retire on the profits made from the sale of our humidifiers.

No sir, we can't boast about our products that much and be honest about it, but we do claim that dealers have increased their sales and profits since they have handled the Skuttle line of automatic humidifiers.

Naturally there are reasons for this and here they are: First, we have been manufacturing and improving humidifiers for 22 years. Second, our policy of close cooperation with our dealers has enabled them to stand behind every Skuttle humidifier they sell. Third, our prices are low so that there is a good margin of profit in every unit sold. Fourth, there is little or no expensive servicing required, because all Skuttle units are trouble free in operation.

Doesn't it seem logical that the Skuttle line is the one for you to handle? Let us prove that it is; write us today.



WRITE TODAY FOR

J. L. SKUTTLE COMPANY

**Skuttle**  
AUTOMATIC HUMIDIFIERS

INFORMATION

999 FRANKLIN ST., DETROIT, MICH.

# WISE • SERIES "A"

## AIR CONDITIONING UNIT



You'll have to handle a COMPLETE line if you want to get your name out in front of the competition these days. A line that can supply you with units for each and every installation and particularly a handsome, efficient air conditioning unit.

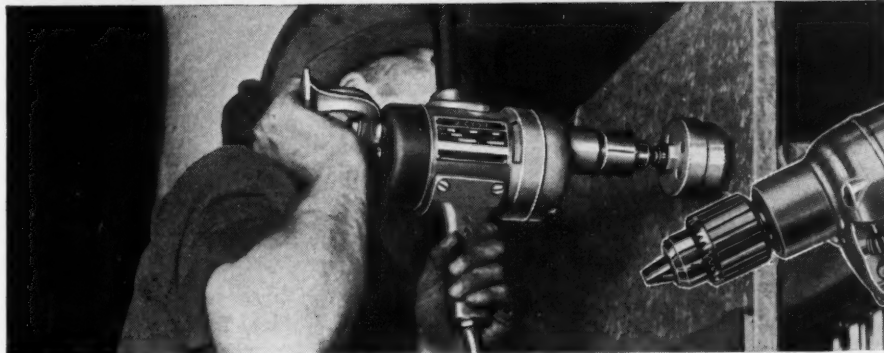
The WISE line has just the unit to take care of any problem you run up against in making a modern, up-to-date installation. Illustrated here is the WISE Series "A" Air Conditioning unit. The square enameled casing with its rounded corners and top moulding is extremely modern in appearance and will harmonize perfectly with newly decorated basements.

It's just the unit to help you keep out in front of the leaders. Once installed you can forget it . . . and there's a handsome profit on each installation!

Write us today for literature.

**WISE FURNACE COMPANY - AKRON, OHIO**

**3/4" TO 3 1/2" HOLES IN SHEET MATERIALS  
WITH STANLEY DRILL & HOLE SAWS**



With this Stanley No. 124 Electric Drill and a set of Stanley Hole Saws, you can cut clean, round holes from 3/4" to 3 1/2" quickly and easily in any sheet material. Ask your dealer to demonstrate, or write today for free literature. Stanley Electric Tool Division, The Stanley Works, 131 Elm Street, New Britain, Conn.



**STANLEY #124  
ELECTRIC DRILL**

A Compact, Rugged, Low-Priced Drill of 1/2" capacity. Useful for dozens of everyday jobs in your shop.



**STANLEY HOLE SAWS**

Cut clean holes in any material. High-speed alloy-steel blades. Malleable iron, true-milled holders. Improved locking device for firm anchor.



**STANLEY ELECTRIC TOOLS**  
"COST LESS PER YEAR"



# For ventilation jobs to brag of

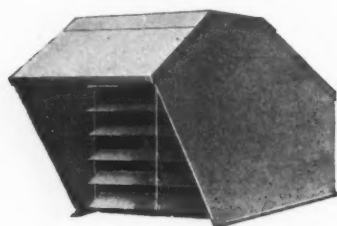


(Brown's Diner, Haverstraw, N. Y.)

## install the **REX-AIRATE** Roof Model

The illustration above shows how one sheet metal man readily adapted the REX-AIRATE roof model to take care of a unique ventilating requirement. But flexibility of installation is only one reason why leading contractors, the country over, prefer REX-AIRATE. There is a size for every need—a model for every location—a reputation for dependability to back you up.

If you have not yet obtained your copy of our latest catalog and our generous dealers' discount—do so at once—while hot weather continues to assure an active market.



Automatic ceiling shutters to fit each size available.

Reserve  
Motor  
Power

Reinforced  
Pent-house

Snap-action  
Shutters

Mail the coupon for data sheet

AIR CONTROLS, INC.

1933 W. 114th St., Cleveland, O.

Please send roof model data.....catalog.....

FIRM .....

INDIVIDUAL .....

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CITY .....

AA739

that the total overhead was 74.07 per cent. These figures caused a real discussion by the delegates and Mr. Davis continued the examples from his own shop records, in a chalk talk on the blackboard. These gentlemen were heartily thanked by those in attendance, because the talk was presented in the absence of Vice President H. S. Hahn, Easton, whose subject it was.

### Resolutions

The resolutions committee referred that part of Mr. Keist's report having to do with Codes and Licensing to the Legislative Committee for proper study and action and the action of the resolutions committee was concurred in by the convention. A resolution of cheer and best wishes for a speedy recovery for the son of W. C. Markle, was adopted unanimously, spread on the minutes and dispatched to him.

A resolution was adopted, the sense of which was that membership in the state association could only be obtained through membership in a local association where such local associations were functioning.

### 1940 Convention

Harrisburg was selected as the convention city for 1940, the dates to be announced later.

Too much credit cannot be given the Beaver Valley Association and its various committees for the splendid way they entertained the convention.

The banquet on Friday night was another highlight in the convention, and was an unqualified success.

### Auxiliary Officers

At the annual meeting of the Distributors and Salesmen's Auxiliary the following officers and directors were elected:

President—Dan Boyer, W. F. Potts & Sons Co., Phila.  
Vice President—E. D. Workman, York Corrugating Co., Harrisburg Branch.

Secretary-treasurer—H. S. Criswell, McClure-Johnson Co., Pittsburgh.

Directors—Warren B. Stokes, J. H. Crago, B. A. Morrison, Geo. McCrory.

The Auxiliary went on record as agreeing to cooperate in every way with the state association officers in the furtherance of the membership drive, and the betterment of the industry. E. D. Workman of York Corrugating Co. was the high membership producer for The State Contractors Association, closely followed by most of the auxiliary membership.

H. A. McGinnis, 63, proprietor of the H. A. McGinnis Roofing and Sheet Metal Company, Chattanooga, Tennessee, died April 12 at his home 1112 East View Drive, Lookout Mountain. Mr. McGinnis had been active in Chattanooga trade circles and in the civic life of the city over a long period.

James H. Mathis, 49, business agent of the Sheet Metal Workers Union No. 4, from 1908 to 1927 and later secretary of same union died March 7, from a heart attack, at his home at 939 Tulley Street, Memphis, Tennessee.

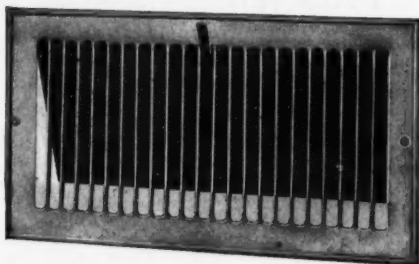


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**U.S. AIR CONDITIONING  
REGISTERS**  
GIVE YOU  
**GENUINE QUALITY**  
For YOUR COMPLETE NEEDS  
IN THE  
**LOWER PRICED CLASSES**

**For Low-Cost Forced-Air Installation**

**Style 102**

When Non-Directional Flow will serve the purpose and economy is important, use Style 102. This is the quality and the only Embossed Bar Design in the lowest price level.

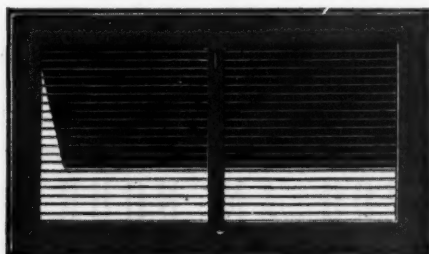


Style 103 (Perforated—not embossed) is another Design in the Low Priced Group made in a vertical oblong lattice design.

**For Directional Flow Air Conditioning**

**Style 153**

Here's the solution to the problem of good quality installations at competitive prices. U. S. Louver Type Registers (style 153 is typical)



give you all directional flows and non-vision at exceptionally low cost. Minimize number of styles by use of U. S. Inset Panels.

With these popular registers there is complete interchangeability—in all styles—of Band Steel, Studding and Baseboard Frames.

**Send for New POCKET MANUAL 27R**

U. S. Registers are handled by leading jobbers and distributors of furnaces, registers, and heating supplies including the nation's largest manufacturers of warm air furnaces. Write for the new Pocket Manual No. 27R which shows you all the popular U. S. designs and sizes.



**UNITED STATES  
REGISTER CO.**

**BATTLE CREEK, MICHIGAN  
MINNEAPOLIS • KANSAS CITY • ALBANY  
SAN FRANCISCO • NEW YORK, N. Y.**



**This  
Magic Package**

**CUTS FUEL COSTS**

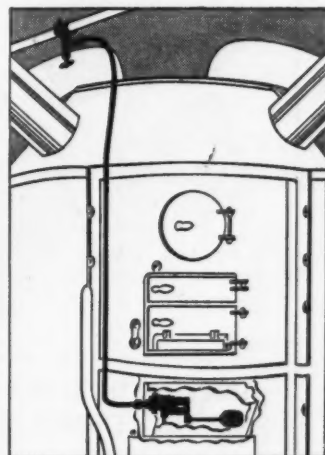
**M-VB** *helps you sell humidification*

Tests show that proper humidification saves in fuel by providing a comfortable temperature 8° lower! Sales point! And good humidifying makes a healthier atmosphere. Sales point!

The M-VB package contains everything you need to make the installation in just thirty minutes on a warm air furnace. Don't bother to drop the fire, it's not necessary.

Get into the swing with other Master Plumbers on this profitable, M-VB quality product. Do your selling on it this summer when householders have the money to spare. It Costs little, Sells fast, and Lasts a long, long time. All moving parts are protected against corrosive action.

**SEE YOUR WHOLESALE  
NOW.** He probably has a large enough stock on hand to take care of you. Or write direct to Morency Van-Buren, Sturgis, Michigan. By return mail we'll send you full information, plus leaflets to interest your customers.



**M-VB**

**MORENCY-VAN BUREN DIVISION  
SCOVILL MANUFACTURING CO.  
Sturgis, Michigan**

**SCOVILL SAVES YOU TIME IN SELLING—TIME IN INSTALLING**

Complete lines of water closet tank fittings and humidifier stocks also maintained at Waterville, Connecticut and San Francisco.

## Air Resistance In Straight Ducts

(Continued from page 45)

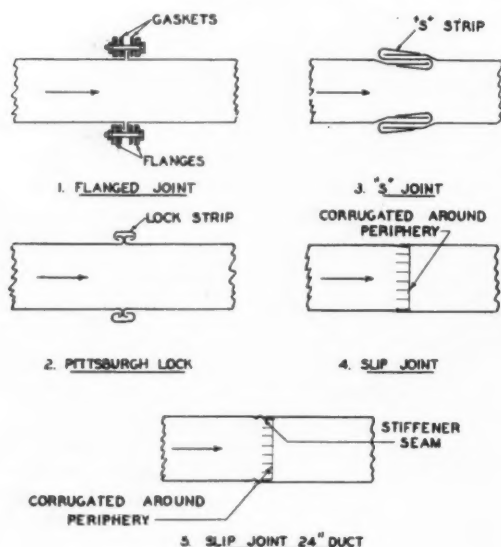


Fig. 3—Detail of the different joints used

uniform rate of air flow during the observations. In most tests, several pressure drops between as many different pairs of static stations were observed in order to give pressure drop flow relationship through different parts of the duct, particularly as it was affected by variations in joints. The pairs of static pressure stations were

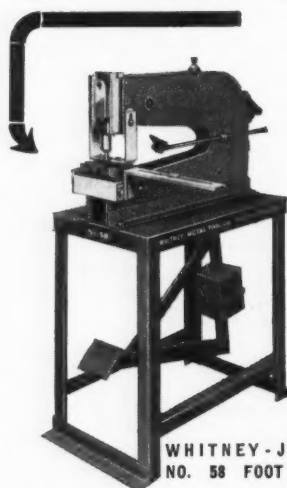
chosen so as to include the pressure drop through the maximum length of straight duct including all joints, the maximum length of straight duct not including any joint, and the drop across a single joint. A series of tests was always made on a given test set-up at velocities ranging from the minimum giving a satisfactory pressure difference for the given size of duct, up to the maximum possible with the fan and duct arrangement, which was usually about 3500 fpm. Check tests were always made on a given set-up on at least two different days. If these results did not check, the system was carefully examined for defects, usually leaks, and tests were repeated until satisfactory results were obtained. Joint leaks were prevented by first sealing with plasticine and then wrapping with adhesive tape which was painted aluminum.

## 1905 Windows

(Continued from page 32)

"Many people stop, look at both sides of the window, and comment on the reality of it. We have had people tell us that the old basement looks exactly like their's, and they would certainly like to have the new set-up. Very frequently in our demonstration in the showroom, we take the customer outside and say, 'Now this is exactly what your basement would look like, because it is identically the same equipment that we will install in your home.' The impression created by this picture certainly does last."

**PUT THESE .... ON HERE ... and MAKE THESE**



### TIME STUDY SHOWS COST OF MACHINE AND DIES RETURNED IN 2½ DAYS!

Test made on production of Cheeks for 3½" Duct Elbow, 26 ga. galvanized iron. Labor at \$1.00 per hour.

Made by hand, 15 pcs. per hr. .... \$ 6.66 per 100  
Made on machine, 200 pcs. per hr. .... .50 per 100  
Daily saving, labor only, 8 hr. day ..... \$98.56  
Cost of No. 58 Foot Press, including Blanking and Forming Dies, also standard round punch and die holder, bolster plate, and gauges ..... \$253.50  
(F.O.B. Rockford, Illinois)

Cost of equipment returned in 2½ days.

Note: Die cut pieces far superior to hand made.

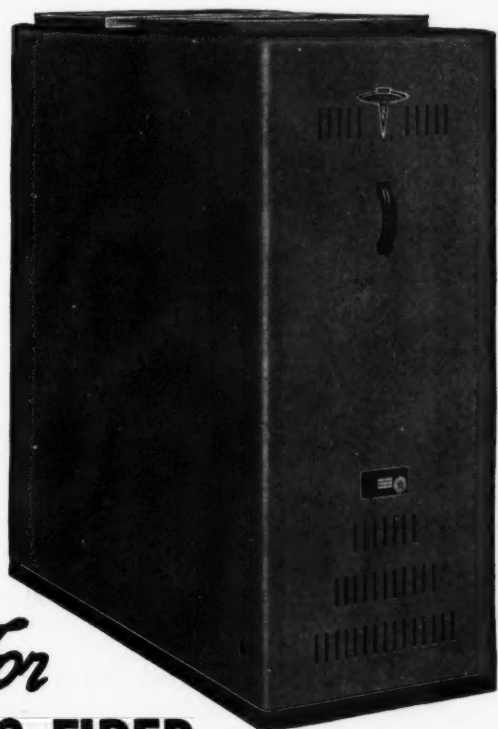
### WHITNEY-JENSEN METHOD REDUCES COST 80%!

By using a standard Whitney-Jensen No. 58 Foot Press equipped with special blanking and forming dies, Elbow Cheeks for duct fittings can be turned out complete at the rate of 200 an hour or better. IN ADDITION, the No. 58 Foot Press can be used for dozens of other jobs throughout the shop. Write for particulars.

**WHITNEY METAL TOOL COMPANY**  
91 FORBES ST., ROCKFORD, ILL.

# RYBOLT

STEEL AIR CONDITIONER



*For*  
**GAS FIRED**  
**CONVENIENCE and CLEANLINESS**

● Here is a gas fired RYBOLT Air Conditioning Unit that will make an instant appeal to the customer who appreciates the convenience and cleanliness of gas heating. Scientifically designed burners insure the proper mixture of gas and air for perfect combustion with high heating efficiency and unusual economy. Throughout the life of the unit all harmful products of combustion are completely vented to the chimney.

Clean, dirtless and quiet operation, perfect air filtration, ample humidification, complete control equipment, welded steel construction, modern design and attractive styling are irresistible selling features of this advanced unit.

*Write for interesting free folder*

**THE RYBOLT HEATER CO.**  
615 Miller Street • Ashland, Ohio



Not one . . . but *three* outstanding features! That's RU-BER-OLD-WATSON No. 43-A Asbestos Paper.

Feature No. 1 is **STRENGTH**—extra strength obtained by special processing. This paper is made from 95% pure asbestos. It is flexible. It is of accurate caliper. It has unusual wet strength, so essential when paste is applied.

Feature No. 2 is **COLOR**. This paper is blue-white—a soft, neutral tone not easily marred by dust.

Feature No. 3 is **FINISH**. This paper is smooth and water-repellent on one side—rough-textured for adhesion on the other side. The special surface treatment gives the paper a beautiful finish with simply one coat of paint or aluminum.

Use No. 43-A Asbestos Paper for protecting air conditioning ducts, wood partitions, wrapping furnace pipes, lining stoves, ovens and gas ranges.

Mail the coupon for **FREE** 5-foot test sample. Compare! You, too, will say No. 43-A is the ideal asbestos paper!

## RU-BER-OLD-WATSON ASBESTOS PAPERS

The RUBEROID Co., Insulation Department  
500 Fifth Avenue, New York City

AA-7-39

Send us your free 5-foot test sample of No. 43-A Asbestos Paper. We understand this places us under no obligation.

Name.....

Address.....

City..... State.....

Since Ruberoid sells through wholesale trade only, please give jobber's name.

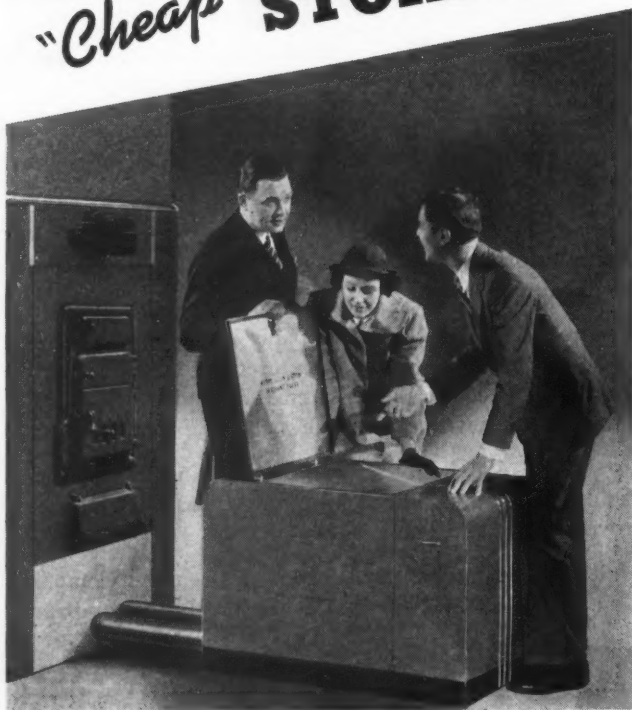


**FREE** THIS CANISTER CONTAINING  
5 foot Sample





**FED-UP WITH  
"Cheap" STOKERS?**



● Had your "belly-full" of service troubles? Now's the time to change to Econ-O-Col, the "Stronghearted" Stoker. No transmission replacements in over four years. A stoker that's made right, priced right . . . built by a financially-sound company . . . backed by an aggressive program of sales promotional helps . . . and ready to help you build a solid business with greater NET profits. Write, wire or phone today for details on the money-making 1939 Econ-O-Col Dealer Franchise!

**ECONOCOL  
COAL BURNER**



**ECON-O-COL**

*The "Stronghearted" Stoker*  
MANUFACTURED BY COTTA TRANSMISSION  
CORPORATION, ROCKFORD, ILLINOIS

## Association Activities

### Illinois Ass'n Picnic Meeting

On Sunday, June 18, officers and members of the Sheet Metal Contractors Association of Illinois met at a basket picnic in Starved Rock State Park for the purpose of deciding upon a program to stimulate interest in the proposed state code to license heating contractors and apply an inspection service under local ordinances. About thirty contractors and their families attended.

In the discussion a review was presented of the progress made a year ago to get this proposed code through the state legislature. Various members and guests outlined the provisions considered necessary in a workable code. These provisions, in general, were that the state code if passed should automatically permit every man now in business to secure a license without any examination and that each city or district in the state should supplement the state code with a local ordinance with inspection. Under the suggested state code all contractors would be compelled to design and install according to the codes and violation would mean withdrawal of the permit. Men or companies engaging in business in the future cannot obtain a license without taking an examination. Violators, also, would have to take an examination before their license is returned.

Development of a definite code was left to the code committee appointed at the last annual convention by President Walter. It is proposed to continue discussion of this problem from time to time during the summer and fall and officers and the committee welcome suggestions from local organizations and individual contractors.

### Wholesalers Standard Work Week

The Hon. George P. Darrow of Pennsylvania has introduced Bill H. R. 4631 in the House of Representatives, as an amendment to the Fair Labor Standards Act of 1938, commonly known as the wages and hours law, the purpose of which is to provide the continuance of the 44-hour work week for employees engaged in certain wholesaling and distributing establishments.

In addition, Senator Miller of Arkansas has proposed a measure now before the Senate Committee on Education and Labor which includes the same provision as the Darrow Amendment.

George A. Fernley Secretary-Treasurer.

### Standard Test Code for Fans

Propeller Fan Manufacturers Association, General Motors Building, Detroit, Michigan, has adopted a certified rating label, copyrighted, to be used by PFMA members exclusively. The association believes the label will prove to be a badge of guarantee to the purchasers of fans that air deliveries of the fans they purchase will be in accordance with the Standard Test Code for Centrifugal and Axial fans.

V. C. Shetler, Secretary-Treasurer.

### Erie, Pennsylvania

The Sheet Metal & Roofing Contractors' Association of Erie, Pennsylvania, has been reorganized with the following officers:

President, Robert C. Warren.  
Vice President, P. S. McCreary.  
Secretary, Harry G. Hartline.  
Treasurer, B. A. Buman.

### Weaver Opens New Shop

Clarence Weaver, P. O. Box 1744, Jackson, Tennessee, is opening a shop to handle sheet and metal products, repair and clean furnaces. Mr. Weaver has been engaged in the heating business for the past fifteen years—five years as a partner in the firm of Beach & Weaver Heating Co., and previously with McGee Ross Hardware Company when they handled furnaces.

## NEW, LOW PRICE

### BREUER'S Ball Bearing TORNADO FURNACE & BOILER VACUUM CLEANER

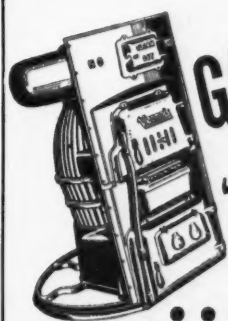


Now you can buy a TORNADO for no more than you would pay for a cheaply constructed, converted household cleaner. A real quality machine, this sensationally low priced model 64-A combines those features which have made

TORNADO cleaners the leaders for years,—ample cleaning power, big sturdy G. E. motor mounted on Norma ball bearings, portability and a complete set of attachments really designed for furnace and boiler cleaning. Built to last for years and help you make a real profit on furnace cleaning.

*Here is the Tornado you have been waiting for.  
Write for full specifications and FREE TRIAL OFFER.*

**BREUER ELECTRIC MFG. CO.**  
5082 N. Ravenswood Ave. Chicago, Illinois



## GRAVITY JOBS *are* "GOLD MINES" ...FOR YOU!

The time-tested gravity furnace is still the largest seller on warm-air heating installations and it will pay you well to go after those jobs with Mt. Vernon VERNON Furnaces.

The Vernois Furnace gives you operating perfection and long-lasting qualities. Constructed of Vernalloy, the metal famous for its "Hell on Earth" tests, and possessing many other exclusive and superior features, the Vernois Furnace will meet and beat any competition. Write us today for further information. We'll shoot it to you by return mail.

### Vernois FURNACES

**MT. VERNON FURNACE & MFG. CO.**  
Mt. Vernon Illinois

## "BB"

The Mark  
of  
Quality

Seam  
Locked  
Every  
Few  
Inches

"Shur-  
Lock"  
Pipe

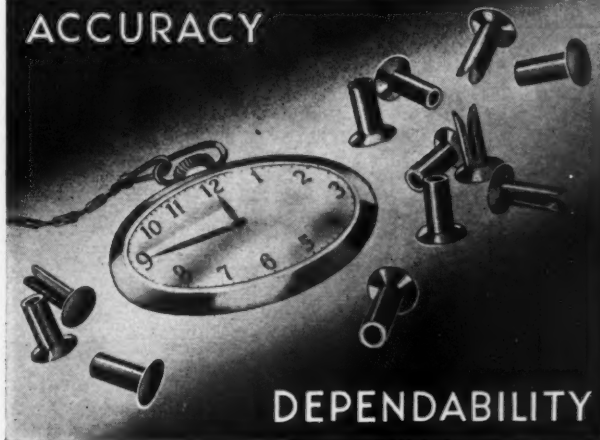
# BERGER BROTHERS CO.

229-237 Arch Street, Philadelphia, Pa.

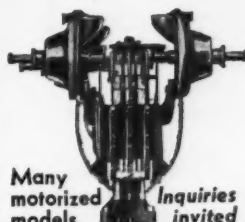
EAVES TROUGH  
GUTTER HANGERS  
CONDUCTOR FASTENERS  
MITRES  
END PIECES AND CAPS  
CONDUCTOR HEADS  
ORNAMENTAL STRAPS  
VENTILATORS, ETC.

Write for catalog of the "BB" Line  
Buy from your jobber

## ACCURACY



## DEPENDABILITY



Many  
motorized  
models  
available  
in single  
stroke and  
multiple  
drive

*Inquiries  
invited  
with  
samples of  
work you  
wish to do*

when **PRECISION**  
counts —

There is one item in your specifications you can decide upon without hesitation—T R & S Rivets. T R & S quality means every rivet, no matter how many thousands you need, is usable; rivets of uniform preciseness, accurately gauged to drive with smoothness, to clinch with non-brittle efficiency. We have solved the riveting problems of America's leading industrial concerns.

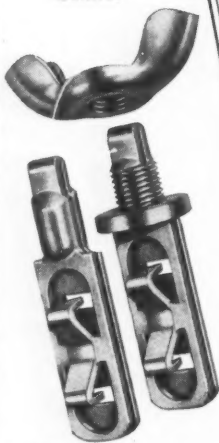
## TUBULAR RIVET & STUD CO.

*World's Foremost Producers of Rivets*  
WOLLASTON MASSACHUSETTS



Put this on your  
'MUST' LIST

E-Z-ON  
Damper  
Control



Tinsmiths—Send us your  
jobbers name and we  
will mail you free sam-  
ple of E-Z-ON damper  
regulator.



• APPLIED WITH ONLY A HAMMER  
ELIMINATES RIVETS . . . SCREWS . . .  
HOLE-PUNCHING  
SAVES 25% to 33 1/3% OF LABOR TIME  
Only PLIERS needed to set in position  
WILL NOT BREAK, RUST or RATTLE  
COSTS NO MORE THAN ORDINARY DAMPER CONTROLS

**M. A. GERETT CORPORATION**

2945 N. 30th Street  
MILWAUKEE, WISCONSIN

EVERYTHING  
YOU'VE WANTED IN  
A FURNACE  
CEMENT



Here's a furnace cement that  
will live up to all of your  
expectations; a plastic, easy-  
working cement that is used  
and approved by the coun-  
try's leading furnace manu-  
facturers and repair men. It  
adheres to both sides in a joint making it gas tight. Tharco is  
an "asbestos fiber" Furnace Cement; will withstand intense  
heat and direct flame. Is odorless, indestructible, fire and acid  
proof. It will not shrink, and if properly applied, will not  
honeycomb or powder. Try this time tested furnace cement  
on your next job. You'll be surprised at the difference.

WRITE FOR FREE SAMPLE

MANUFACTURED ONLY BY  
**THE ARMSTRONG COMPANY**  
DETROIT DALLAS CHICAGO

Outstanding Products for more than 25 years

## News Items . . . . .

### Toledo Sheet Metal Apprentices

The Toledo Sheet Metal Working Apprenticeship Committee, Macomber Vocational High School, held its second annual, pre-graduation meeting to honor the graduates, and award prizes for scholarship.

The four apprentice graduates were:

Jack Faunce—Faunce & Faunce.  
Walter Habel—A. H. Lumm Co.  
Frank Pickett—Gerken Heating Corp.  
Harry Kahn—Howard Baker Heating Co.

Honor students who have done outstanding work during the past year are:

Frank Pickett—Gerken Heating Corp.—Edwin A. Scott Award.  
Joseph Boyle—Gerken Heating Corp.—Edwin A. Scott Award.  
Clarence Schroeder—Hoffman and Harpst—Throm Award.  
George Loucks—Faunce & Faunce—American Artisan Award.  
Frank Mitchell—A. H. Lumm Co.—American Artisan Award.  
Hubert Mays—Schmidlin Bros. Heating Corp.—American Artisan Award.

Introductory remarks were made by Carl T. Cotter, Director of Vocational Education and Program Chairman.

#### Program

A Few Words from an Apprentice—Dale Bruot, Apprentice at the A. H. Lumm Co.

A Few Words from the Union Local No. 6—Harry Hauser, President—Sheet Metal Workers Union Local No. 6.

A Few Words from the Sheet Metal Contractors—Henry C. Bitter, Secretary—Toledo Sheet Metal and Roofing Contractor's Association.  
"What Shall We Do"—Earle S. Smith, President—Toledo Porcelain Enamel Products Co.

Presentation of Awards—F. M. Dannenfelser, Principal—Macomber Vocational High School.

H. C. Elwing, Secretary.

### Union Apprentice Class

On Saturday, May 27, 1939, the Union Apprentice Class for sheet metal workers held its closing exercises at the South Boston High School. This year the class consisted of thirty-five boys who attended school every Saturday morning from 8:00 a. m. to 12 noon. These boys received training in pattern drafting, shop practice and welding under the direction of Thomas A. Roche, Coordinator, Stephen Reilly and Alwin K. Milch.

The apprentice committee, Matthew Cavanaugh, President; Alfred Ellis, Secretary; C. J. Cox; and J. McNulty, awarded prizes to the outstanding boys in the apprentice group. The competition for the prizes was very keen and the committee had a difficult job to decide just to whom the prizes belonged.

James T. Moriarty, Commissioner of the Department of Labor and Industries of Massachusetts, spoke briefly to the boys and then presented the prizes to the following:

Name	Employer
1st year apprentice. J. Walker Pratt.	Stanley Priggen.
2nd year apprentice. Bernard Joseph.	Burgess and Blacher.
3rd year apprentice. Charles McKenna.	Cavanaugh and Earley.
Philip A. Hough	Parke L. Davis
4th year apprentice. Harold Lindquist	Atlantic Roofing Co.

Brief talks were also given by Alfred Ellis, Secretary of the Committee, Harry Russell of the Federal Apprenticeship Committee and Rudolph Marginot, Coordinator for the Apprentice Training Program in Boston.

Thomas A. Roche, Coordinator.

## Obituary

### Augie Hardten Dies

Augie Hardten, of A. Hardten & Co., Ottawa, Illinois, sheet metal contractor handling Rudy products, died recently. Margaret Pacini, bookkeeper, will continue the business as active manager.

### Frank W. Tufts Dies

Frank W. Tufts, advertising and sales promotion manager of the Continental Steel Corporation, Kokomo, Indiana, died suddenly at his home in Kokomo, May 24th. He was 48 years old. Death was caused by a heart condition resulting from an emergency operation for appendicitis.



## TO INSTALLERS OF GAS APPLIANCES

### DON'T READ THIS AD

if you are satisfied that the GAS VENTS and FLUES you are installing are giving 100% satisfaction because if you are you must be using

### METALBESTOS

"THE PERFECT GAS VENT & FLUE PIPE"

and are therefore familiar with its merits.

If you are not, you owe it to yourselves and your customers to get acquainted with METALBESTOS. True, it costs a few cents per foot more than some pipes, but don't let that scare you. These other pipes are not made SOLELY for venting gas appliances as is METALBESTOS and in no way compare with it from standpoints of EFFICIENCY, SAFETY, DURABILITY and LOW COST INSTALLED.

Actual installation figures prove that METALBESTOS can be installed two to three times more quickly than other pipes. SO WHY WORRY ABOUT A FEW CENTS PER FOOT?

Once installed METALBESTOS ends your venting problems. No going back to the job to provide drains for condensate and no trouble with combustion due to improper draft.

WRITE FOR INFORMATION TODAY TO

**WILLIAMS-WALLACE COMPANY**  
160 Hooper St. San Francisco, Cal.

ONE SURE WAY TO STEP UP YOUR PROFITS FROM FURNACE CLEANING AND REPAIR JOBS... Include

## THERMO-DRIP HUMIDIFIERS



• Are you satisfied with the meager profit the average furnace repair or cleaning job might pay? Would ten dollars or more *extra profit* from each of those jobs be attractive? Then include THERMO-DRIP Automatic Humidifiers. They're putting this extra profit into the pockets of hundreds of alert furnace men. Try it. Get the facts about THERMO-DRIP Humidifiers from your jobber or ask us for full particulars.

**AUTOMATIC HUMIDIFIER CO.**  
18th and Main Streets CEDAR FALLS, IOWA



### Now Available in MONEL

Whether made of this extra strong, non-corrosive metal or of brass, nickel silver or other standard metals, non-kinkable BEAD CHAIN\* lends itself to many practical uses in the sheet metal field.

## BEAD CHAIN\*

With our 25 years' experience we are prepared to cooperate with sheet metal manufacturers in the development of standard or special uses of BEAD CHAIN\* to meet usual or unusual conditions.



THE BEAD CHAIN MANUFACTURING CO.

\*Reg. U. S. Pat. Off. 8 Mt. Grove St., Bridgeport, Conn.



## 9 Models UTILITY *Air* KOOLERS

Complete evaporative coolers with Utility Blowers, "No-Sag" pads, self-contained water recirculator.

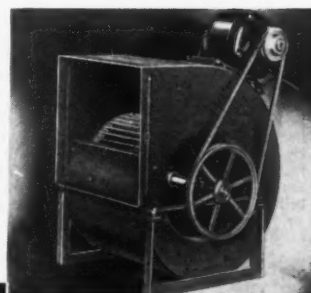
## UTILITY

### BLOWERS

Dynamically balanced, self-aligning bearings, die-formed, baked enamel finish, single or double inlet.

### UTILITY FAN CORP.

2528 Santa Fe Ave., Los Angeles, Calif.  
122 E. 42nd St., New York, N. Y.





**G&O  
RADIATION**

## FINNED COILS

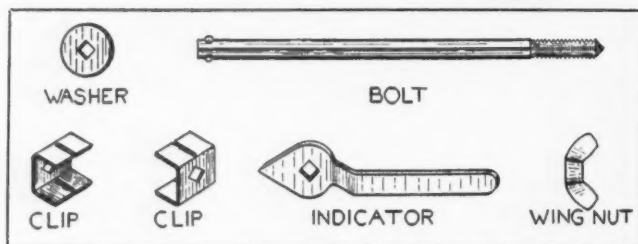
**G&O FINNED RADIATION COILS**  
for all industrial applica-  
tions are available in a  
wide range of sizes, for  
high and low pressure  
operation.



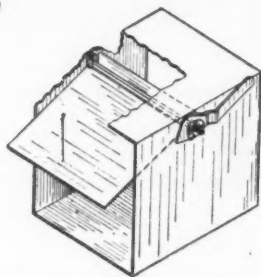
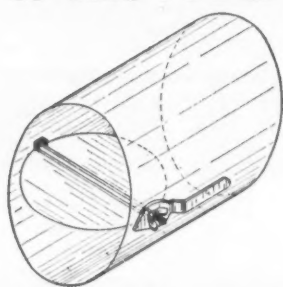
SEND  
FOR  
CATALOG

**THE G&O MANUFACTURING COMPANY**  
New Haven, Connecticut  
*Pioneer Manufacturers of Square Finned Tubing  
in the United States*

## 60 seconds from This . . .



to This . . . or This



with the **New**

Here's faster assembly . . . improved efficiency . . . and lower cost in the new Minute Damper Control unit. Minute design eliminates tiny nuts, bolts, rivets, sheet metal screws. Minute dependability assures rigidity without sag or buckling. Chatter-proof and air-tight for wide range of damper sizes and shapes. Send for FREE sample, prices. Distributors: Write for money-making proposition.

## MINUTE DAMPER REGULATOR

★  
**JOAL MFG. CORP.**  
2056 CANTON ST. TOLEDO, OHIO

## With the Manufacturers . . .

### Richardson and Boynton Move

Richardson and Boynton Company, New York City, announce their new location at 274 Madison Avenue—Telephone: Lexington 2-0040, the same as formerly.

### Lau Blower Purchases Plant

The Lau Blower Co., Dayton, Ohio, has purchased a modern factory building at Home and Orchard Avenues, Dayton, as a new plant to take the place of the present



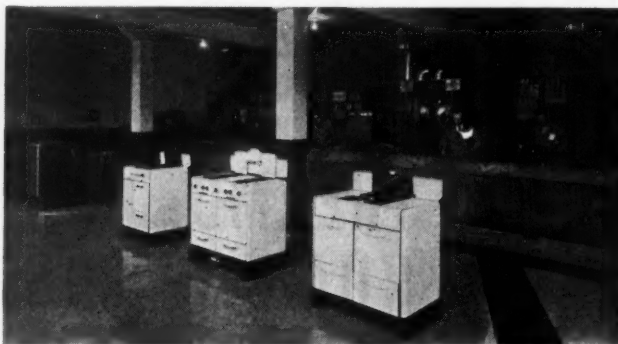
location at 954 E. Monument Avenue, according to an announcement by E. B. Lau, president and general manager. The company also plans to erect an addition to the present L-shaped building.

When completed the plant will have a floor area of approximately 55,000 square feet.

### Capitol, Indianapolis, Increases Space

Al Nemec, general manager of the Capitol Furnace and Stove Repair Co., Indianapolis, announces removal of his company to larger quarters at 523 East Washington Street, with 25,000 square feet of warehouse space.

The company plans to give the dealer trade in Indiana,



Ohio, and Kentucky as complete service as possible on repairs for all furnaces, boilers and stoves.

One floor is devoted to the storage of gravity and forced air furnace fittings, register, controls, etc. An equally spacious part of the building is occupied by the furnace department for maintenance of adequate stocks of the Norco and Peninsular lines of furnaces which the company distributes from warehouse stock. The company also offers a complete line of registers, blowers, filters, tinnern's supplies, cast iron smoke pipe, paints, tinnern's red, chimney tops, etc.

The official opening was held Friday evening, July 7. Al Nemec, the manager, was on deck and introduced Ed Carter, who opened the meeting and introduced I. W. Rowell of the Air Controls, Inc., whose subject was "Why Do We Have Blowers?" Perl S. Miller, president, Lamneck Products, talked on "The Heating Industry as I See It Today." The final speaker of the evening was D. C. Ellison of Northwestern Stove Repair who took as his subject, "Topics of the Industry as I See Them Today."

There were over 300 dealers from in and around Indianapolis who inspected the new plant.



## PREMIER FURNACE CLEANERS

—For a Real Clean-up!

You're all set to "clean-up" right when you buy Premier! Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the



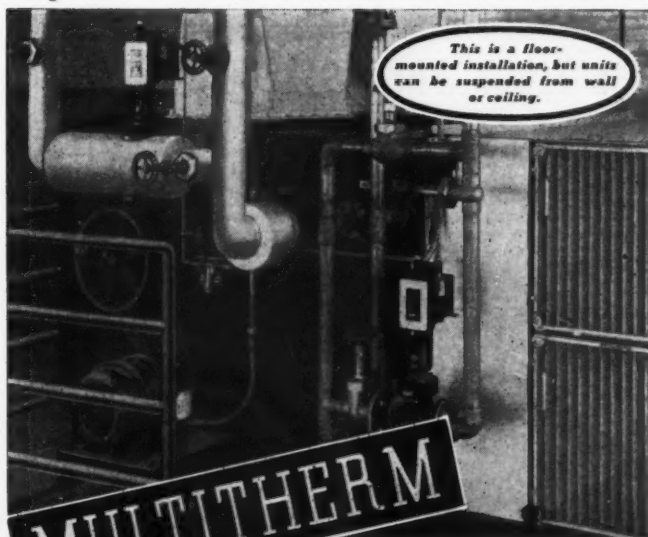
container for suction and blowing use in cleaning air ducts, registers, grilles, radiators and air conditioning equipment.

New Improved Models—  
Completely Equipped

$\frac{5}{8}$  Horsepower **\$69<sup>50</sup>**

1 Horsepower **\$89<sup>50</sup>**

**ELECTRIC VACUUM CLEANER CO., INC.**  
1734 Ivanhoe Road Cleveland, Ohio



# MULTITHERM

## Conditioning Units

**Simplified—Compact**  
**—Easily Installed**  
**—Quiet Operation**

Ideal for  
Stores,  
Theatres,  
Restaurants,  
Offices, etc.

Last word in low-cost air conditioning. Backed by 25 years' experience. Wide range of combinations—a unit of proper size and capacity for practically any cooling, heating or complete conditioning need. Built for quiet operation and trouble free service.

SIZES UP TO 13,600 CFM. Write for Bulletin 107.

**CLARAGE FAN COMPANY • Kalamazoo, Mich.**  
SALES, ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

COMPLETE  
AIR CONDITIONING  
VENTILATION  
HEATING  
COOLING  
MECHANICAL DRAFT  
FANS & BLOWERS FOR  
INDUSTRIAL NEEDS



## PERFORATED METAL

*Any Metal. Any Perforation*

The uses for perforated metal are numerous and increasing. Industry requires it for a thousand purposes where adaptability makes necessary perforations of many sizes and shapes.

For ornamentation it provides beauty of design in a variety of metals and finishes. Our facilities for the manufacture of perforated metal are unexcelled and we hope to serve you.

## THE Harrington & King

PERFORATING CO.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

## STAR BRAND

### FOR EASIER, BETTER RIVETING

Star Brand Rivets mean faster, smoother going on any riveting job—and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

If your jobber or dealer can't supply you—write direct.



COPPER BRAZERS AND TINNERS' RIVETS  
ROUND, FLAT AND COUNTERSUNK HEADS

★ ALSO SPECIALS FROM  
BRASS, BRONZE, NICKEL-SILVER  
EVERDUR, MONEL, NICKEL  
AND OTHER NON-FERROUS METALS

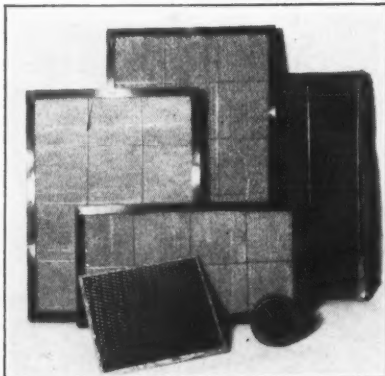
OTHER PRODUCTS  
SCREW MACHINE PRODUCTS  
STOVE BOLTS—MACHINE SCREWS  
MACHINE SCREW NUTS  
Special headed & threaded parts  
made from wire and rod

**BLAKE & JOHNSON CO. Est. 1849**  
WATERVILLE • CONNECTICUT



## RESEARCH PRODUCTS CORPORATION

### *Re - Fil - Able* "WALTON" AIR FILTERS



In the Research Products Corporation Re-Fil-Able "Walton" Air Filter you have a fast moving item that will lift your new and replacement filter business far out in front of your competition.

Consisting of a permanent steel frame with a removable cover and replaceable trisection filter, these filters function with a minimum of attention and highest efficiency.

In addition to dependability and efficiency the Research Products Corporation Re-Fil-Able "Walton" Air Filter enables you to pass on to your customers a saving of approximately one-third of their filter bills.

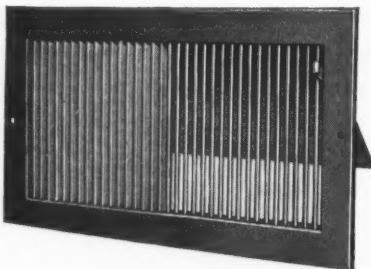
Write us today for further information.

**RESEARCH PRODUCTS CORP.**  
MADISON WISCONSIN

## NEW CATALOGUE

### NEW REGISTER FACES

The New Rock Island line of Registers now shown in complete new catalogue just off the press.



No. 802 Wall Register—Vertical Vanes

The New Rock Island Air-Vane Registers are of bar type fabricated construction—Attractive Appearance—Rigid Construction—Vertical or Horizontal Vanes—Simple, secure adjustment.

New Catalogue gives full particulars, prices, etc. Write for a copy.

**Rock Island Register Company**  
Rock Island Illinois

## New Literature

For your convenience in obtaining copies of new Literature, use the coupon on page 98.

### 170—Galvanized Rectangular Pipe and Fittings

Milcor Steel Company, Milwaukee, is distributing catalog No. 35A, covering their furnace pipe and fittings. A section is devoted to galvanized rectangular pipe and fittings for forced air systems.

### 171—Register, Faces, Grilles and Ventilators

The Independent Register Co., 3747 E. 93rd St., Cleveland, is distributing Catalog No. 39G of 24 pages, covering Independent warm air registers, cold air faces, grilles and adjustable ventilators.

### 172—Physical Properties Chart

Joseph T. Ryerson & Son, Inc., 16th & Rockwell Sts., Chicago, is distributing a Physical Properties Chart, giving tensile strength, yield point, elongation, reduction of area, hardness and other average physical properties, of nearly 50 different types of steels. The data is arranged on an 8½x15 in. chart, for use under a desk glass.

### 173—Gas Winter Air Conditioners

The Henry Furnace & Foundry Co., 3473 E. 49th St., Cleveland, is distributing a 12-page catalog illustrating and describing Moncrief gas-fired winter air conditioners—the new "Aristocrat," and the "Special," with data and dimensions.

The Aristocrat is manufactured in capacities from 61,200 to 244,800, and the Special 61,200 to 122,400 Btu at the register.

### 174—Ward Catalog No. 39

Ward Machinery Company, 564 W. Washington Blvd., Chicago, is distributing Catalog No. 39—machines, tools and supplies for fabricating sheet metal. Specifications and prices are included. The equipment described are products of nationally known manufacturers for whom the company is a recognized distributor.

Ward offers recommendations for specific problems upon receipt of sketches, drawings and detailed range of sizes and capacities being fabricated.

### 175—Catalog 39AC and Engineering Manual

Hart & Cooley Manufacturing Co., Holland, Michigan, has just released Catalog No. 39AC. Section 1, pages 2 to 11, is an engineering manual with technical data on registers and grilles, with detail drawings. Pages 17-18 show an installed view, a detailed drawing, line cuts with all dimensions indicated, which grilles and registers fit which frames, and list prices of all items, both parts and assembled. Individual pages may be furnished to the trade. No. 86 Register with turning blade valve is shown. Trade Discount Sheet is included.

### 176—Simple Blueprint Reading

The Lincoln Electric Company, 12818 Coit Road, Cleveland, announces a new book entitled "Simple Blueprint Reading with Particular Reference to Welding and Welding Symbols."

"Simple Blueprint Reading" takes the student in easy stages to a clear comprehension and, by following this method of study in the practice of reading, to a mastery of this subject. Not intended to be an exhaustive treatise, the book affords a sound basis in the fundamentals.

A comprehensive explanation gives the student a clear understanding of various symbols used in drawings of different types of welded joint, including butt, corner, fillet, lap, etc. 85 illustrations contained in the book include practical examples of drawings of a number of machine parts, pipe connections, general construction, tanks, etc.

"Simple Blueprint Reading" contains 140 mimeographed pages, 8½ by 11 inches, and is bound in durable paper. Price 50 cents in the United States, 75 cents elsewhere.

# 'BLOW HOT BLOW COLD

Forced and conditioned air units impose a new responsibility on asbestos furnace cement.

Avoid complaints and insure permanent satisfaction by depending on the Extra Strength of

## LACLEDE FURNACE CEMENT THE CEMENT THAT

### ALSO MAKERS OF FIREZIST

the new hand moldable plastic lining for use in all types of domestic heating equipment. Write for descriptive literature.

### DRIES FASTER SETS STRONGER LASTS LONGER

For a permanent and absolutely air and gas tight joint insist on Laclede brand. There's a distributor near you. FREE SAMPLE ON REQUEST. Address...

**LACLEDE-CHRISTY**  
ESTABLISHED 1844

411 N. SEVENTH ST.

## MAUREY V-PULLEYS Solve F. H. P. Transmission Problems

THE New MAUREY Cast Iron V-Pulley will be found particularly efficient when used with Blowers and Air Conditioning Equipment. Tests prove that its new scientific design—five specially shaped spokes—give less resistance to the flow of air in these installations than the ordinary pulley. It is exceptionally sturdy, well balanced and true running. Available in seven sizes—7.2" to 14.2" O. D.

MAUREY Steel V-Pulleys are well known for their trouble-free service with F. H. P. installations in Stokers, Fans, Air Conditioning and Refrigeration Units.

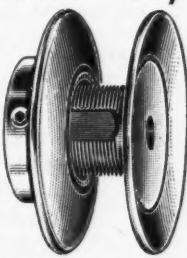
Made of STEEL with heavy rolled edges giving extra sturdiness. Hubs are machined steel or malleable iron, not die cast. Carried in stock in a wide variety of sizes for both "A" and "B" belts.

WRITE FOR CIRCULARS GIVING PRICES AND DESCRIPTIONS.

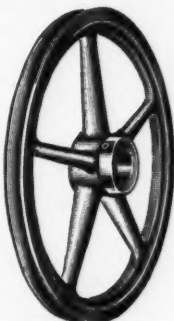
### MAUREY Variable Pitch Diameter Pulleys



Solid steel construction. Adjustment permits speed variation of as much as 30%. Fine, accurate, milled threads, 20 to the inch, assure close adjustment. Designed for Air Conditioning Units. Solid steel—not die cast. Made in 4 sizes, 3 1/4" to 4 1/2 inches in diameter.



**MAUREY MANUFACTURING CORP.**  
Wabash at 29th, Chicago, Illinois



Cast Iron

## MAKE YOUR ATTIC FAN INSTALLATIONS

...fully  
automatic



THE RELIANCE Time Switch is completely automatic! It turns the current both ON and OFF regularly day after day, at the desired hour, and should not be confused with timers that must be started by hand.

Attic ventilation is an increasingly lucrative field and you can make it pay you even more by selling your jobs complete with Reliance switches, making them fully automatic!

Reliance switches relieve the family of any bother. They will perform year after year with little if any attention and will soon pay for themselves in time and money saved by eliminating needless operation of the fan.

Drop us a line TODAY for further information on this summer money-maker. We'll shoot it to you by return mail!

**RELIANCE AUTOMATIC LIGHTING CO.**  
1929 MEAD STREET RACINE, WISCONSIN

## This Does Make More Money— We Prove It—Free!



● Hundreds of heating plant men stepped up business and profit from the very day they started cleaning heating plants quicker, easier, at less cost. With the Specialized Super. The Super Plan Book told how to really sell cleanings first, and then sell all services—repairs, replacements, new plants. They got the business. So will you. Make more money this summer. The first easy step is to



### USE THIS COUPON

The National Super Service Company  
1944 N. 13th Street, Toledo, Ohio

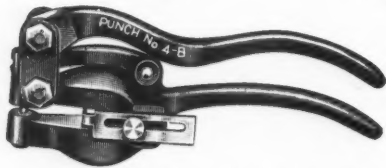
Send me the Plan Book and complete information about your free trial and the new low-priced Super.

Name .....

Street Address .....

City and State .....

# WHITNEY LEVER PUNCHES



NUMBER  
FOUR "B"  
PUNCH

This punch for sheet metal work has a capacity of  $\frac{1}{4}$ " through 16 gauge. Weight 3 lb. Length  $8\frac{1}{2}$ ". Depth of throat 2". Complete tool includes three punches and three dies of specified sizes with die adjusting key. A time-saver for your up-to-date shop.

And here's another handy tool for the modern shop—the No. 2 Punch. Length 23". Capacity  $\frac{5}{16}$ " through  $\frac{1}{4}$ " iron, weight 12 lbs., depth of throat 1  $\frac{11}{16}$ ". Punches and dies  $\frac{3}{32}$ " to  $\frac{1}{2}$ " by  $\frac{1}{64}$ ".



NUMBER TWO  
PUNCH



**W.A. WHITNEY MFG. CO.**  
636 RACE ST. ROCKFORD, ILL.

## "IN TWO YEARS HE HAS A DISPLAY ON MAIN STREET"

"The Williamson Heater Company  
Cincinnati, Ohio

Gentlemen:

Please send me a 24" TRIPL-IFE furnace for display in my new show room on Main Street.

When I started handling your line your salesman wanted me to put a furnace on display, but I was located then so nobody could see it if I did put one in. Now, I have a big window where everybody who passes can easily see what a nice furnace I handle so please send the furnace right away by truck.

I am expecting to get a big business this year so please rush this order.

Sincerely yours,

XYZ

, Illinois."

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company or nearest jobber. Representative will call within 24 hours.

**FREE:** Complete, easily understood short method for figuring air conditioning jobs. You can complete your figures, price job in one hour flat. Write Dept. 2.

**THE WILLIAMSON HEATER COMPANY**  
Cincinnati, Ohio



Complete Line  
Quick Service



You can triple your profits with "Tripl-ife"

## New Literature . . . .

For your convenience in obtaining copies of New Literature, use the coupon on this page.

### 177—Hand Brake Catalog

Dreis & Krump Manufacturing Co., 74th St. & Loomis Blvd., Chicago, is distributing a 32-page catalog, No. 40-H, covering all types of Chicago steel hand bending brakes—standard hand brakes, box and pan brakes, portable brakes and universal brake. Specifications are included.

### 178—Vertical Forced Air Heater

Bryant Heater Co., 17825 St. Clair Avenue, Cleveland, is distributing a 4-page folder illustrating and describing the Bryant Vertical forced air gas heater for low-cost heating in the basementless home, office, store or factory. Testimonials are included.

Another 8-page booklet is entitled "So You're Going to Build a Home," and tells of the advantages of gas as a fuel.

### 179—Rebuilt Machinery

Interstate Machinery Co., Inc., 109-11 S. Clinton St., Chicago, has just published catalog No. 393, listing their stock of rebuilt machinery for metal fabricating, structural steel and sheet metal, also production machinery and machine tools—descriptions and specifications of more than 2,000 machines.

The inside back cover contains tables of useful information, tonnage capacities of presses, and decimal equivalents.

The catalog has a durable binding and cover, is printed on heavy enameled stock  $8\frac{1}{2}$ x11.

#### FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave.,  
Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

109	110	111	112	113	114	115
116	117	118	119	120	121	122
123	124	125	126	127	128	129
170	171	172	173	174	175	176
177	178	179				

Name ..... Title .....

Company .....

Address .....

Are you Manufacturer—Jobber—Dealer—

## ACME "Hot Spot" WELDERS

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

Write for literature and prices

**Don't Rivet  
SPOTWELD!  
with an ACME**  
Lifetime Guarantee!

Complete range of sizes

**ACME ELECTRIC WELDER CO.**

Distributors in principal cities

5619 Pacific Blvd.



Huntington Park, Calif.  
(Los Angeles County)



## CHECK YOUR AIR-CONDITIONING INSTALLATIONS

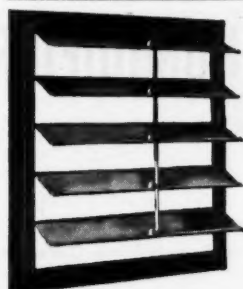
WITH THE

## "ALNOR" VELOMETER

This all-purpose air velocity meter indicates air velocities directly and instantaneously on the scale in f.p.m. without the necessity of timing or mathematical calculations. Standard range 0-300, 0-3000 f.p.m. Other ranges available up to 18,000 f.p.m.

Write us today for a folder giving more complete information.

**ILLINOIS TESTING LABORATORIES, INC.**  
412 N. LaSalle Street Chicago, Illinois



ELGO TYPE

Get our prices on Automatic Shutters, Stationary Shutters, Hand Operated Shutters, Ceiling Dampers, Balanced and Back Draft Dampers.

## Elgo Ventilating Specialties

### An Extraordinary Automatic Shutter

Unusually sensitive to air currents—yet the shutters fit with a snugness never before achieved in an automatic shutter, and are rattle-proof. In addition, they have a new-type swivel joint that does not wear loose, and is good for the life of the shutter. Sizes from 10" to 60" square—also rectangular.

Write for Circular and Prices!

**ELGO SHUTTER & MANUFACTURING CO.**  
634 W. Warren Detroit, Mich.

Free CATALOG

## LONGER LIFE — MORE PROFIT WITH A DOYLE FURNACE CLEANER

Heating men know that Furnace Cleaning is profitable, cash business, but to keep labor cost down you need a one-man portable, efficient and long lasting cleaner that will give you many years of useful service.

Many of the first Grand Rapids Cleaners, sold years ago, are still making money for their owners. Ample capacity, larger intake, hose and fan, physically larger motors, provide long life and minimum depreciation.

Write for the DOYLE PLAN that shows you how to get more business and put money in your pockets, every day—even from a cold start.



**DOYLE VACUUM CLEANER CO.**  
227 STEVENS ST., S. W. GRAND RAPIDS, MICH.

## PORTABLE SHEARS ALL-ALLOY



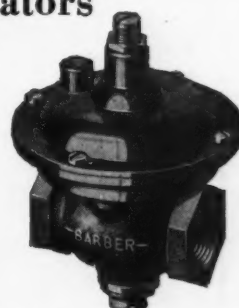
ALL-ALLOY No. 2 cuts up to 1/4" steel plate.  
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.  
Special blades may be had for shearing stainless steel.

FULLY GUARANTEED

**BREMIL MFG. CO. Erie, Pa.**

## BARBER Gas Pressure Regulators

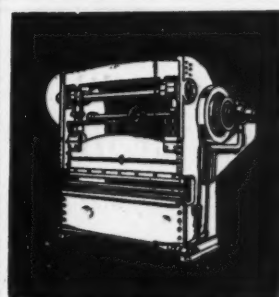
Barber Regulators have everything that a Quality Regulator must have—compact, attractive appearance in keeping with the modern trend in heating equipment design—high precision standards of manufacture—operate at very low pressure drop. All bronze body, brass working parts. Sizes 1/4" to 1 1/2", A. G. A. approved. Write today for catalog and prices on the complete line of Barber Conversion Burners and Regulators.



The Barber Gas Burner Co.

3702-4 Superior Avenue  
CLEVELAND . . . . . OHIO

Made in 1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" and 2" sizes.



PRESS BRAKE



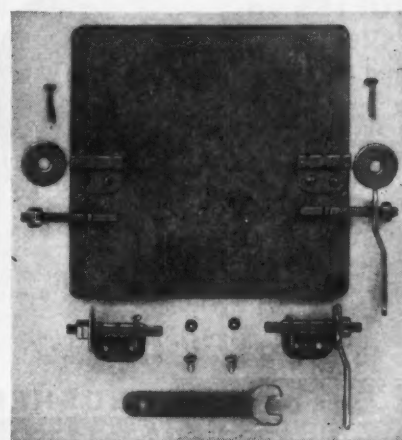
HAND BENDING BRAKE

Steel Brakes—Presses—Shears

## DREIS & KRUMP MFG. CO.

7404 LOOMIS BLVD.

CHICAGO



## THE NEW K-B DAMPER CONTROL

Unique construction features separate rods and holders, allowing positive locking and close adjustment. No duct deforming.

Adjustable for any insulation or furring—always shows true position. ASK YOUR JOBBER—or write direct for particulars. Send 25c for working sample and direction sheet.

**G. L. KERENTOFF**  
2803 Jefferson Ave.,  
Cincinnati, Ohio.

## Repair Parts GUARANTEED TO FIT



Ask About Our

## TANK WATER HEATERS

A Summer Profit Maker

## A. G. BRAUER SUPPLY CO.

316 North Third St. • St. Louis, Mo.

## "Night Cooling" with the New PEERLESS FURNACES



There's no better time in the year to sell and install new PEERLESS furnaces and air conditioning plants than **right now**. Give your customers the truly economical comfort of cooler homes this summer, and healthful circulated heat next winter. All latest models in the complete PEERLESS line are equipped with powerful, silent blowers, filters and humidifiers, offering simplified, inexpensive night cooling in summer and maximum heating efficiency in winter. Prices are lower, profit margins higher. Write for literature and proposition.

★ **PEERLESS FOUNDRY COMPANY**  
1853 LUDLOW AVENUE, INDIANAPOLIS, INDIANA

## AVOID ... Smoke Complaints with NU-DRY FURNACE CEMENT

No furnace man need have smoke complaints if he will use NU-DRY FURNACE CEMENT when setting up his furnace jobs

Because—

It does not crack, bloat or powder when furnace is fired immediately after applied. Takes less material to set a furnace.

Will not shrink and keeps joints tight. No loss because it will not harden in container.

Send for information.

**THE PYROLITE PRODUCTS CO.**  
1221-1231 W. 74th St., Cleveland, O.

## Tune in for PROFITS on Furnace Cleaning Time with Schaefer Flue and Furnace Brushes

Savings your customers enjoy with clean furnaces will more than pay for these new SCHAEFER FLUE AND FURNACE BRUSHES. Put these attractive and serviceable Brushes on prominent display—they'll practically sell themselves, with their sparkling, brilliant RUSTPROOF Steel Bristles and handles. They wear from 4 to 6 times longer than other brushes—and clean much better and easier.

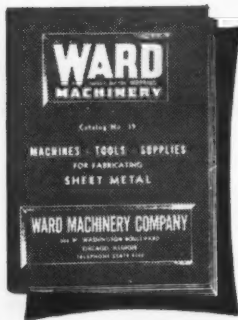


Write for your story of Furnace Cleaning Profits.

Tie in on this story early—for higher Summer, Fall and Winter Profits!

**SCHAEFER BRUSH MFG. COMPANY**  
117 W. Walker Street, Milwaukee, Wisconsin

**SCHAEFER BRUSHES**  
BUY SCHAEFER-IT'S SAFER

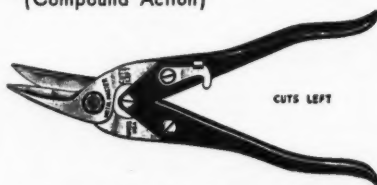


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WITH HALF  
THE  
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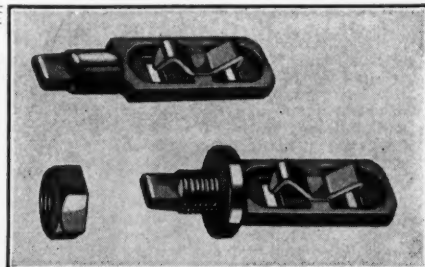
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## New!

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Cedar Rapids IOWA



# Classified

## SITUATIONS WANTED

Heating Salesman capable of making plans for gravity or forced air. Address Key No. 466, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

A sheet metal man who knows automatic forced air heating and ventilation. Have two years designing oil furnaces with success. 15 years sheet metal and heating experience. Will handle shop, or open shop and handle installation for sales organization. Address Key No. 467, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

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WANTED: By an old established well known furnace manufacturer, a man capable of making forced air heating plans, estimating costs and with sales experience. State age and experience and if possible give reference. Address Key No. 465, American Artisan, 6 N. Michigan Ave., Chicago, Ill.

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One complete new set of tinner's tools, including benches, ladders and sheet iron rack. Also one complete set of used tinner's tools. Write Harding Metal Works, Bismarck, N. Dak.

## MISCELLANEOUS

Salesmen selling sheet metal trade, non-conflicting side line. Burner unit for oil burning space heaters. Meets all competition. Burner unit on market 13 years. Can be made in any sheet metal shop, no special tools required. Commission above the average. Give full details of territory covered and lines now selling. Address Chas. E. Glebe, Box 102, Rankin, Texas.

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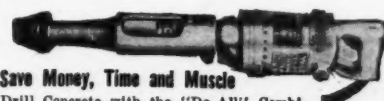


Catalog 393 contains complete descriptions and listings of America's Largest Stock of New, Rebuilt, and Used Punch Presses, Sheet Metal Machinery and Machine Tools.

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of Standard Dimensions



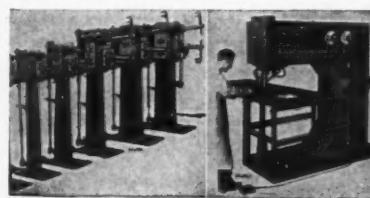
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Featuring New York World's Fair Installations—Now Ready!

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# MERCOID SENSATHERM

*leads*

IN THE QUALITIES THAT DISTINGUISH A FINE THERMOSTAT

## — PERFORMANCE —

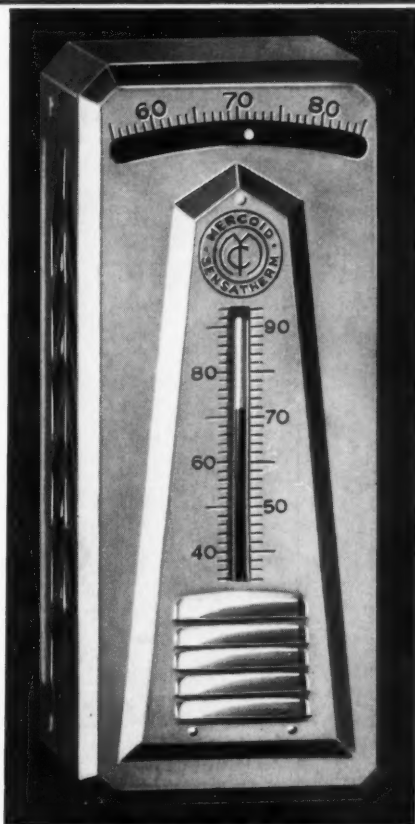
The Mercoid Sensatherm is so designed that the circuit is opened and closed with minimum power. Thus sensitivity is achieved. Room temperature changes are followed so quickly that heater coils and other means of artificial acceleration are unnecessary; consequently avoiding complaints of too frequent heating equipment operations. The Sensatherm is a true thermostat.

## — APPEARANCE —

A pleasingly neat compact instrument contained in a new Alumilite finished case. This beautiful finish is permanent, will not absorb dust, and can be readily cleaned. It harmonizes with any scheme of interior decoration. Openings at the sides and bottom are calculated with mathematical precision to allow maximum air passage. There is no top opening to allow the dust accumulations which mar walls above thermostats.

## — SAFETY —

The Sensatherm is equipped with a sealed mercury contact switch which is not affected by dust, dirt or corrosion. There are no exposed conducting parts to create a possible electrical hazard. Mercoid room thermostats whether high or low voltage have always been constructed in this manner. • Thoughtful buyers will insist on this feature.



## — LONG LIFE —

The Sensatherm is a tried and proven thermostat. Many thousands in use in the field on installations made since 1931 are still operating perfectly. Its record of durability is an outstanding recommendation.

BUILD CUSTOMER GOODWILL BY SUPPLYING THE ONLY INSTRUMENT  
POSSESSING THESE FOUR OUTSTANDING SELLING FEATURES

THE MERCOID CORPORATION • 4201 BELMONT AVE. • CHICAGO, ILL.

More Profits  
with the **MILCOR**  
Heating Line

**MILCOR**  
Furnace Wall Stack and Fittings  
cut hours from assembly time  
to make your jobs  
more profitable

You save time, make money . . . yet do the acceptable work that brings more jobs to you.

These popular warm air units of the **MILCOR** Heating Line help you realize a successful season in 1938. For Milcor jobs are smoother, faster, more profitable. There are no "snags" to contend with either in materials or delivery. Exclusive Milcor construction makes plain accessories to fit every condition, make jobs easy to handle. The "Lockjoint" feature, in double tin, makes tools unnecessary. It is quickly assembled by hand, both long way and end way. In the double tin, the "Tite-lock" fits sections together, rigidly . . . and in a way Milcor's conveniently located plants carry a complete stock and are ready to ship your order without delay. All Milcor's prompt service and dependable products to help you make more money . . . to help you do work that pleases customers. Check your Milcor Price List for detailed descriptions of the line. If you haven't a copy, write for one today. Also ask for free catalog.

## **MILCOR** "TITELOCK"

### Furnace Wall Stack and Fittings

The leading double tin pipe. Smooth, strong construction, with no rough edges, makes it easy to handle. No solder needed. 8 lengths — 2" to 48". Reduces fire hazard.

No. 36  
Center Boot

Adjustable Sections  
Can be adjusted to any  
length. 6" to 12".

No. 25  
Tee

#### Sectional View

"Tite-lock" construction. "Tite-lock" is 1 1/4" deep. Shoulder guides sections together. Long runs erected without extra bracing.

## **LOCK JOINT**

(Pat. No. 2,038,389)

### Single Tin Wall Stack and Fittings

Assembled by pressing tongue into locking seam and turning notched ends over. End lock made by pressing head into lock. No tools needed. Each length shipped in two pieces, completely nested, saving storage space and room on truck.

Universal Boot

First Floor  
Baseboard Head

## **MILCOR STEEL COMPANY**

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